NOV 18 1924

TELEPHONE ENGINEER

VOLUME 28 NOVEMBER, 1924 NUMBER 11

All Conditions Are Alike to Strowger Automatic

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The adaptability of Strowger Automatic to all sorts of telephone problems, is fully appreciated by large operating organizations everywhere. They have studied its operation under the most exacting circumstances and have adopted it as standard for exchanges of every size.

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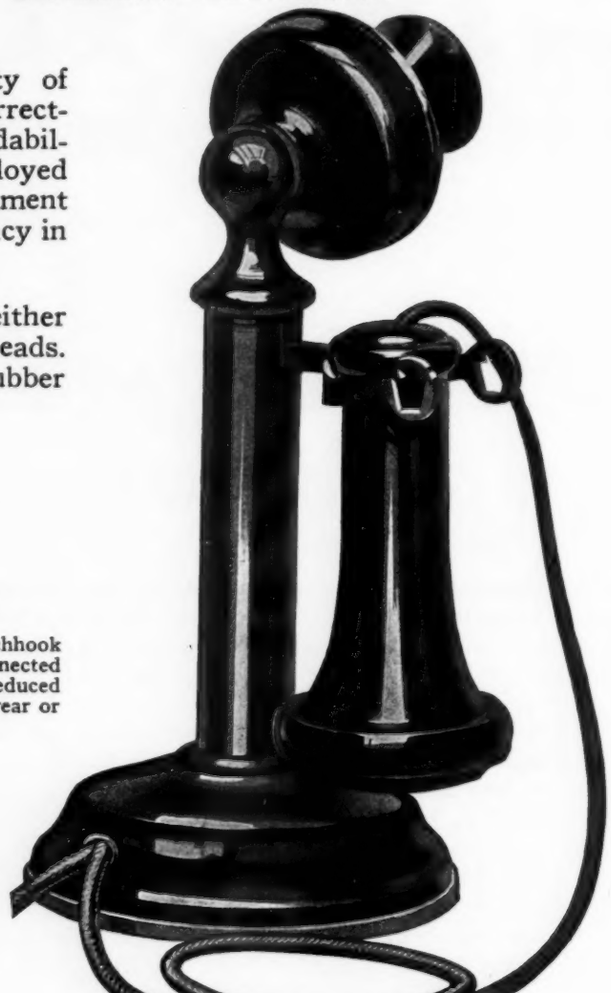

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FOR OVER 30 YEARS MAKER OF GOOD TELEPHONES

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THE KEYNOTE-BETTER MANAGEMENT

Political conventions are usually opened by the address of some gifted and fluent orator who is supposed to sound the keynote of the convention and of the campaign. Brilliant imagery, humor, pathos, ridicule and all of the other tricks of the Ciceronian art are employed to arouse enthusiasm and to guide the hearers into the desired paths of action.

In trade conventions the orator is noticeably absent. Those who attend and those who speak are plain individuals who talk clearly and to the point on concrete problems without attempting to dress up their phrases with rhetorical trimmings. In such a convention it is frequently more difficult to discover the keynote, but nevertheless there is always some idea or some issue that is a real keynote of the convention.

At the convention of the United States Independent Telephone Association we are sure that President MacKinnon would disclaim any intent to make a keynote speech when he gave his complete and authoritative report of the work of the association and the problems of the industry. Yet he unmistakably pronounced the keynote of the convention and of association work for the coming year, which may be summed up in the following words: The problem of the telephone industry is to provide competent management for those properties that are now managed inefficiently.

At the present time there are few problems of national scope that greatly influence the stability or welfare of the telephone industry. The problems of securing adequate revenue, of financing extensions of plant so that demands for service can be met, of maintaining a quality of service that will meet the needs of the users, of securing and adequately providing for the necessary workers in the industry and of establishing good relations with the public are essentially local problems.

In a large number of properties all of these problems have been met and solved successfully, through competent local management. In some properties one or more of them remain to be solved, but, given time, the management is competent to solve them. In a few properties the solution of the difficulties seems a long way off and the problem is how to improve conditions in such properties. Obviously, if the bad conditions continue to exist there is some inefficiency in the management.

There is no power that can step in and take over the management of a system that, by its inefficiency, is lowering the tone of the entire industry, but much can be done by providing the weaker companies with information, advice and assistance that will tend to bring them up to the level of the better properties. This is the problem which the association seems to have set for itself in the organization of its divisional committees and in its calls upon the state associations for assistance.

With an organized effort to study the more important management problems of the day and with better co-operation between associations and companies whereby the associations will study local conditions in specific cases and the companies will submit their difficulties to the association for consideration, there is no question but that the general quality of management in the telephone industry will be much improved.

INDEPENDENT GENERAL STAFF FUNCTIONS

For several years, in season and out of season, this journal has been preaching the necessity of a general staff organization in the Independent telephone industry. It does not claim to have originated the idea, for the idea is almost as old as association work in Independent telephony. Neither does it claim to have convinced telephone men that such a staff is a desirable thing, for this is, almost, a self-evident proposition. It may, however, take some small credit to itself for having convinced many telephone men that the establishment of such a staff is entirely possible and practicable and that it can as easily be done now as at some undetermined time in the future.

To many telephone men, the idea of a general staff has meant a group of highly paid specialists, far away from the practical problems of the field, dictating operating methods which must be followed by all. This is not the case, even in the highly organized general staff of the Bell System. Even there, the specialists do not study problems on their own account, but they are directed to make intensive studies of various problems, because there is a real need in the operating field of solutions of those problems. One has only to go back into history a little: for example, to the cable conferences of 1887 and 1889, to

find that a general staff existed in the Bell System long before there was an organized group of full-time employees at headquarters.

While there is a great advantage in having paid men at headquarters to do the detailed work, and while we believe this, ultimately, must come at Independent headquarters, the general staff in the Independent field, always, must be made up, largely, of men from the operating field and must be responsible entirely to the operating field. The foundations for such an organization have been laid and at least three divisions—accounting, plant and traffic—have been established.

The publication of the Toll Text and Reference Book and the conducting of the divisional conferences at the Chicago convention are the first concrete evidences that the staff organization is beginning to function. The results thus far have been encouraging and the interested attendance at the divisional meetings shows that the field is ready to co-operate and assist with the work.

There are, of course, many difficulties still to be overcome. As Chairman Stadermann of the plant division said, it is difficult to determine what problems to attack in order to get the most benefit in the least time. In the traffic conference, Mr. Collins pointed out another task: that of getting the material before the people who have use for it. But these are far from being unsurmountable difficulties. Now that a start has been made, the way will become clear.

The work must go beyond the conducting of conferences at the national convention. Useful as this is, it does not reach a sufficiently large number of people and the results are not in a form that can be placed on file and used for reference when needed. Material must be prepared in printed form and must be given wide distribution, to be of maximum value. Plans for doing this have been announced and no doubt notice will be given when the publications are available.

A promising start has been made. There is no question that the general staff organization, as a clearing house for ideas and information, will become a valuable agent for putting better management into such of the Independent properties as are in need of it, and will be of great assistance to others, even if they are getting along well at the present time.

TONIC "FOR THAT TIRED FEELING"

For the twenty-eighth time, the Independent telephone interests of the country have met in convention and the men and women who attended have gone back to their homes and their businesses for another year of hard work. There are those who say that conventions are all alike; that the same people attend; that there are the same kinds of meetings; that there are the same kinds of exhibits. Perhaps this may seem to be true to the casual visitor who passes through the halls, shakes hands with a few friends that he has not seen since the last meeting, glances through the doors at the exhibits which he notes are in the same rooms year after year, sits down near the door of the assembly rooms for a few minutes during the general meetings and then goes his way.

To the dyed-in-the-wool convention goer, there may be similarity but the conventions never fall to the dead level of monotony. He meets old friends but he makes new ones as well. He visits the exhibits and finds not only the standard apparatus and material that is shown from year to year, but also he finds displays which bring before him all of the latest developments of the art. He is a faithful attendant at the general and special meetings where he hears papers and discussion on subjects which, in themselves, are not new but into which new ideas and practices are being introduced and he contributes his own experience by taking part in the discussion.

When the convention is over—and, for him, that means when the last meeting is adjourned—he returns to his home and attacks with new vigor the special problems of his business which now appear to him in a new light by reason of the broader outlook he has obtained through contact with the knowledge and experience of his fellows. To such a one the convention is ever new.

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TELEPHONE ENGINEER is issued the 15th of each month. Copy can be accepted as late as the 8th of the month preceding date of publication. Where proof must be seen, allow ample time for transmission in the mails. Display Advertising—Rates on application. Classified Advertising—"Wants," "For Sales," etc.—$4 an inch, or 7 cents a word per insertion.

A SOCIETY FOR TELEPHONE DEVELOPMENT.

A London contemporary carries a notice of the formation of a society to promote the development of telephone service in England. Its object will be to popularize the telephone service and, in this way, to create a larger number of telephone users. Such a society scarcely would be necessary in this country, where private enterprise has been given a free hand to develop the industry. Instead of having a single society for telephone development, we have several thousand located in cities, towns and villages from the Atlantic to the Pacific—and nearly every community has its exchange, with each exchange a center for further development.

Division Conferences Go Big

Independent Convention at Chicago Featured by Successful Conferences of Plant, Accounting and Traffic Executives—Pioneers in Great Reunion

More than 800 telephone men and women from all parts of the country gathered at Chicago from October 21 to 24th to attend the 28th annual convention of the United States Independent Telephone Association. As has been the custom for several years past, the meetings were held at the Hotel Sherman where splendid accommodations for the visitors, for the meetings and for the exhibitors were provided.

The outstanding feature of the attendance was the greatly increased number of men and women from the plant, accounting and traffic departments of the operating companies. The organization of separate divisions within the association, and the provision of special conferences for a consideration of the work of each of the divisions brought about a large attendance at the general sessions and the special conferences which gave ample evidence of the response of the membership to the plan of development of technical division for service to the industry.

Among the features of the convention other than the general and technical sessions were the large number of exhibits of telephone equipment and supplies. Manufacturers and dealers provided a large number of interesting and instructive displays, showing the latest development in the art, and large groups of visitors were in constant attendance at the various exhibit rooms and booths. On Thursday the Independent Telephone Pioneer Association provided the program of entertainment that has come to be a feature of the convention. Not the least of the features was the opportunity for meeting friends from other parts of the country, and the informal discussions that took place in the halls and lobby during intermissions in the regular program.

Reports of Officers on Tuesday Program

The opening meeting of the Convention was held on Tuesday afternoon and was devoted to reports of the officers and the chairman of the various divisions. The report of Secretary C. C. Deering was quite brief as the report of the previous convention had been printed and distributed to the membership. Statistics of the membership were given and a preliminary report of the finances of the Association for the current year was presented. The adoption of a new plan for financing the association based on a percentage of gross receipts was placed in operation and the response of the member companies had been highly gratifying.

Following Secretary Deering, President MacKinnon called for reports from the chairman of the accounting, plant and traffic divisions. Mr. A. C. Cragg, auditor of the Tri-State Telephone and Telegraph Co., gave a report of the auditors' meeting of Class A companies in April, and the work of the accounting division since that time. There are many things in the accounting end of the business in which there is no general agreement as to practice or general rules for procedure; among them a universal list of units which should be charged to construction, and a list of units which should be charged to maintenance, a standard practice of pricing used material returned to the store room, and satisfactory rulings regarding destruction of old records. Mr. Cragg indicated the work of the accounting division in attempting to arrive at a more uniform procedure and more satisfactory practice in the handling of these matters. Mr. Cragg also pointed out the necessity of extending the work to companies below Class A, and the advantages of preparing operating reports so that individual companies might compare their performance with that of others in their class. In closing, Mr. Cragg recommended to the executives present that they should insist that their auditors attend accounting conferences whenever possible for them to do so.

The work of the plant division was outlined by Mr. A. L. Stadermann, Chief Engineer of the Citizens Independent Tel. Co., Terre Haute, Ind. Mr. Stadermann discussed the foundation work that had been done, and the plans for carrying on the work by special committees made up of men conversant with the subject under consideration. The real difficulty is to determine the subjects that should be taken up to obtain the greatest benefit in the shortest length of time. The work of the plant division includes work done wholly within the Association and work done in conjunction with outside agencies. Among the outside agencies with which the plant division is co-operating, are the American Engineering Standards Committee,the National Bureau of Standards, the National Electric Light Association and other national bodies. During the year a telephone group has been formed to represent the telephone industry on the American Engineering Standards Committee. This group consists of two representatives of the Bell System and one representative of the United States Independent Telephone Association. This group is now one of the co-sponsors for development of a general set of specifications for wood poles, and is interested in a number of other important projects. In the work of the plant division within the industry attention is being given to the sources of loss due to lack of standardization in material, equipment and practices, such as simplification of hardware used in outside plant and uniformity of dimensions and interchangeability of parts in substation and central office equipment; questions of plant accounting such as the dividing line between depreciation and maintenance as well as questions in connection with installing and retiring plant; the necessary inductive co-ordination between power and telephone lines; joint pole construction and agreements; the economy of use of 24-gauge cable by large as well as small companies, and consideration of the use of creosoted poles for city as well as country use. In closing Mr. Stadermann stated that the plant division hoped to be able to publish bulletins and circulars of value and interest to telephone companies.

The report of the traffic division was made by F. V. Newman, General Manager of the La Porte Tel. Co., La Porte, Ind. Mr. Newman told how the traffic division had undertaken the work of revising the toll operating rules, and referred to the assistance given by Miss Anne Barnes of Des Moines, Iowa; Miss Marguerite Norris of La Porte, Ind., and Miss Lillian Vavasour of Albany, New York. The book of rules has been adopted by a large number of companies, and

the aim of the committee is to place a copy in each Independent telephone exchange.

President MacKinnon's Address

President MacKinnon's annual address to the Association was a masterly analysis of the problems facing the Independent telephone industry. In a general way the most important of these problems are the problem of providing adequate management for telephone companies; the problem of the small exchange, relations with the Interstate Commerce Commission and the Internal Revenue Bureau, and the relations between the radio and wire interests in telephony. In introducing the question of providing adequate management, Mr. MacKinnon quoted results of studies of the financial situation of member companies of the association. During 1923, all classes of companies have improved their situations. The B class companies are making the best showing, with a return of 5.5 percent on the investment. A class companies show 4.6 per cent, and C class companies, 4.5 per cent. Companies are being urged to bring up their averages by adoption of better managerial methods and more accurate accounting. The studies show that those companies that have competent management are seldom in need of assistance in financing. If the company is lacking in management, nothing can be done for it. When investment and rate schedules are averaged up it is found that companies are working about on the same basis, but the net results depend upon the men at the head of the property. The answer to the financing problem is in management rather than lending money, and the problem of management is being worked out by the men who are talking about accounting, about plant work and about traffic work.

Another problem for which we have not yet seen the solution is that of the small exchange which is so small it simply can not pay. The answer has been suggested that more mutual companies should be organized so that the subscriber can carry the load, but this is contrary to the principle that there must be good management. The properties are going down, and no money will be put into them. The proper element to be injected is management, but the problem is how to put management into a property of that size.

During the year the association has been in contact with the Interstate Commerce Commission, and is now endeavoring to have the accounting system of C class companies revised so that it will automatically move into the accounts of B class as the company grows. It is very easy to move from class B to class A, but there is no natural basis for moving from class C to class B.

In internal revenue matters, a constant contact with the Bureau is maintained. It is important that all correspondence with the treasury department come through the association because the man who accepts settlement at government terms on the statement of a field agent makes trouble for all, and frequently agrees upon a principle that is wrong. There is no expense to members for this service of the Washington office.

The association was represented at the recent radio conference at Washington and has taken particular interest in the matter of interconnection of radio and telephone communication. It is predicted that within five years an international service across the seas will be possible from every station to which it is now possible to give long distance service. Independent companies are interested in this problem and their interests will be guarded as far as it is possible to do so.

As a representative of the association, Mr. MacKinnon said that he had attended a conference of all the wire, cable and radio systems in the office of the Secretary of State at which international rules governing communication service were discussed. The government-owned systems of Europe and South America are endeavoring through international agreements to adopt a set of rules which will govern the handling of terminating calls. The Secretary of State was shown the danger of this and as a result the delegates to the Pan-American conference at Mexico City were instructed not to enter into any agreements. This may seem a minor matter to those operating exchanges in the interior of the country, but when considered in connection with radio will become of interest to all.

Following the address of the president and appointment of committees the afternoon meeting adjourned.

Regulation of Telephone Companies.

Regulation of telephone companies was discussed at Wednesday morning session. When the convention re-assembled on Wednesday morning, the report of the nominating committee was made. Chairman D. M. Neill of Red Wing, Minn., presented the names of the following retiring directors for re-election for the term of three years. H. L. Beyer, Grinnell, Iowa; J. C. Duncan, Knoxville, Tenn.; E. D. Glandon, Pittsfield, Ill.; F. B. MacKinnon, Chicago, Ill.; R. E. Mattison, Lincoln, Neb., Houck McHenry, Jefferson City, Mo.; E. M. Prisk, Hazelton, Pa.; L. Q. Trumbull, Chicago, Ill.; W. J. Uhl, Logansport, Ind.; and Ben Woodbury of Chicago. As there were no nominations from the floor, the election was made unanimous.

President MacKinnon then introduced Prof. C. O. Ruggles of Ohio State University, Columbus, O. Professor Ruggles delivered a splendid address on "Commission Control of Telephone Companies from the Public Viewpoint," which appears in full in another place. Following Professor Ruggles, the next address was given by Hon. Lewis E. Gettle, Chairman of the Wisconsin Railroad Commission, who has been connected with public utility regulation almost continuously from the time of the creation of that commission. The subject of Mr. Gettle's address was "Commission Control of Telephone Companies from the Commission Viewpoint." This address also appears in full in another place. Rising votes of thanks were given to both speakers for their efforts.

Introduction of Visitors

One of the features of the convention was the introduction from time to time of visitors from various parts of the country, and representing various division of the industry. Geographically the country was covered by the introduction of Mr. C. A. Rolfe of California, Mr. W. J. Thompson of Maine, Mr. John King of Washington, Mr. Brorein of Florida, Mr. D. M. Neill of Minnesota and Mrs. Daniel of Texas. Canada was represented in the introductions by Mr. Francis Dagger, and by Mr. James Forbes of Waterford, Ont. Utility Commissions were represented by the introduction of Mr. W. H. O'Brien, chief of the telephone and telegraph division of the Massachusetts Department of Public Utilities; Mr. A. R. McDonald, member of the Wisconsin Railroad Commission and J. W. Howatt, supervisor of telephones of the Minnesota Railroad and Warehouse Commission. Judge N. C. Hunter of Wabash, Ind., an old-time Independent executive and a former president of the national association, and Mr. E. F. McKay, secretary of the Oklahoma Utilities Association were also presented to the assembly.

Friday Session Features Important Problems

Promptly at 10 o'clock Friday morning, the final session of the convention assembled in the Club Room of the Hotel. This meeting was arranged in the form of a number of short papers which were followed by discussion in which a large number of those

in attendance took part. The first topic, "Liability Insurance through the State Associations" was presented by Mr. H. E. Bradley, President of the Pennsylvania Association. Mr. Bradley outlined the work of his association in endeavoring to provide employe benefit plans for Independent companies. After many conferences a plan was worked out with the assistance of the Lynton T. Block Company, which gives practically all of the benefits obtained by employes of the Bell System under the plan that has been in operation for a number of years in that system. The exception is the old age pension system, for which there seems to be no practicable general plan at the present time. In general the plan provides benefits in case of accidents in excess of those required under workingmen's compensation acts, benefits in case of sickness or non-occupational accidents, and group insurance for the telephone workers. It required the participation of a considerable number of companies, and efforts are now being made to interest all of the companies in the state. The response has been favorable, and it is hoped that the plan may be placed in operation and that a report of its success may be made in another year.

Following the discussion of Mr. Bradley's paper, a report of the resolutions committee was read. Separate resolutions expressed the appreciation of the association for the work done by the officers, and for the entertainment provided by hotel and by officers and committee of the Independent Pioneers. Resolutions of thanks to the speakers and leaders of the various conferences, and to the manufacturers and suppliers for their exhibits were adopted. A special resolution of condolence in the case of the death of Charles E. Tarte and other deceased members was passed. The action of the association in assisting in securing the repeal of the message tax was commended.

Following the report of the resolutions committee, the next topic of the morning program was the discussion of financing of the small exchange. Mr. J. C. Crowley, secretary of the Minnesota Telephone Association led the discussion. Mr. Crowley expressed some doubts as to the applicability of the Texas plan in states where telephone companies are under the supervision of public commissions. Whatever may be the plan of financing, the first problem is for the telephone company to get its house in order. Mr. Crowley then recited some of his experiences with small companies in his state, and told how some of them had been put on a business basis. But the first problem in most cases is a house-cleaning, he said. The discussion turned to a discussion of the handling of service on connecting lines, and it developed that many companies are not getting a remunerative rate for switching service. A large number of those present took place in the discussions, and many helpful suggestions were brought forward. A feature of the discussion was a report by Mrs. J. M. Daniel, owner of the Georgetown, Tex. telephone exchange. Mrs. Daniel gave her experience with the Texas financing plan which made it possible to rebuild her exchange, and to bring the service up to the point where a satisfactory rate schedule was obtained. The plant is now rebuilt, the service is good and payments on the borrowed funds are being made so that everything is now sailing along fine.

The final topic was on "Storm and Sleet Insurance." On account of the absence of J. A. Pratt, Secretary of the Wisconsin Association, the report was presented by F. H. Runkel of Portage, Wis. Large insurance companies were approached in the matter of storm and sleet insurance, and one was found that was willing to underwrite such insurance. The rate is based upon the proposition that all companies participate in the insurance, and the proposition is now being considered by the Wisconsin Association. On account of the lateness of the hour, the discussion was very brief, and after a few closing remarks by President MacKinnon, the convention adjourned to meet again in another year. Following the last session the executives of the state associations gathered for luncheon and a final conference on state association activities.

Plant Conference

On Wednesday afternoon, Oct. 22, the plant people attending the convention assembled for a conference under the leadership of A. L. Stadermann, chief engineer of the Citizens Independent Telephone Company of Terre Haute, Ind. Mr. Stadermann announced that a number of topics would be brought up for consideration and that the opening discussion of each had been assigned to different men. He then called upon W. H. Wheeler, Jr., chief engineer of the Lincoln Telephone and Telegraph Co., to lead the discussion on Operating Experiences with Inductive Interference between Light and Power Circuits. Mr. Wheeler showed maps to illustrate conditions in the section of Nebraska in which his company operates and outlined the procedure in Nebraska in the building of new power lines. Gustave Hirsch and Ward Snook of Ohio, O. A. Knell of Minnesota, E. D. Glandon of Illinois, F. H. Runkel of Wisconsin, J. N. Cox of Tennessee and R. V. Achatz of Indiana outlined the experience in their respective states. H. N. Faris of Kansas City, Mo., and others also contributed to the discussion.

"The Commercial Survey and Fundamental Plan" was the next topic, the discussion of which was led by H. E. Gray, Plant Superintendent of the Home Telephone and Telegraph Co., of Fort Wayne, Ind. Mr. Gray emphasized the necessity of a long time study of conditions if a plant capable of giving economical service is to be built. A paper by George K. Gann, General Superintendent of the Tri-State Telephone and Telegraph Co., outlining the advantages of No. 24 gauge cable was then read by the chairman. Cost figures quoted indicate a marked saving in plant cost where large cables of small gauge wire can be used.

The discussion on the "Dividing Line between Depreciation and Maintenance" was led by Gustav Hirsch, Columbus, Ohio. A number of accountants joined the meeting for this discussion as their meeting had adjourned a short time before. Mr. Hirsch took up the various plant accounts and gave his views as to the units that were chargeable to replacements and those which were chargeable to expense. A number of those present took part in the discussion and a number of questions were brought up and the answers given. Lack of time prevented discussion of several collateral subjects suggested and the chairman indicated that the plant committee would be giving consideration to many of these topics during the coming year.

Traffic Conference

Better toll operating was the keynote of the traffic conference presided over by Secretary Charles C. Deering. The members of the committee which produced the new Toll Reference and Text Book were present and were called upon for discussion of the book. Miss Anne Barnes opened the discussion by a characteristic story drawing the parallel between the biblical story of confusion of tongues with the conditions that existed in toll operating before rules were formulated. She then gave a summary of the rules contained in the various sections of the book and explained its use for study

and reference. Miss Marguerite Norris of La Porte, Indiana, who was one of the principal contributors in the preparation of the book, was also called upon for remarks.

The discussion then turned to a consideration of station-to-station and person-to-person toll rates. It seems that there is a confused idea of these rates in the mind of the public and some misunderstanding of the evening and night rates which apply to one class and not to the other class of calls. Some of the speakers seemed to believe that the application of night rates on one class of call while maintaining day rates on other classes was difficult to justify. The possible application of reduced rates on Sunday calls was also discussed. Among those taking part in the discussion were Frank V. Newman, La Porte, Ind.; E. L. Gaines, Fort Wayne, Ind.; E. R. Evans, Waco, Tex., and Wm. H. O'Brien, chief of the telephone and telegraph division of the Massachusetts Department of Public Utilities.

The question of getting the use of the toll reference book before the girls at the switchboard was brought up by T. J. Collins of Kansas City, Mo. The suggestion was made that a correspondence course be conducted by the national association. This suggestion met with favor and the meeting voted that a committee be appointed to consider the advisability of establishing such a course. The chair appointed R. S. Brewster, Lincoln, Neb., Mr. Collins and Mr. Gaines as the committee.

The final subject for discussion was overlap ringing. A number of those present expressed themselves as being much in favor of the practice as one that improved toll service generally. There was some dissent, voiced by M. F. Hayman of Terre Haute, Ind., as to its application to smaller companies where there is a closer personal touch with the subscriber. The total attendance at the conference numbered about 40 and the discussions were continued from assembly at 2 p. m. until adjournment at 5 p. m.

Accounting Conference

Telephone auditors and accountants in larger numbers than ever before were in attendance at the convention and their special conference was held Wednesday afternoon under the chairmanship of A. C. Cragg, auditor of the Tri-State Telephone and Telegraph Co., St. Paul, Minn. Three principal topics were assigned for discussion and each brought out numerous ideas which tended to crystallize opinion on some of the doubtful points and which offered suggestions for improved practice in accounting methods.

The first paper, "Materials Accounting," by F. J. Tellman, auditor of the Home Telephone and Telegraph Co., Fort Wayne, dealt largely with the accounting of used material through the Materials and Supplies account No. 122 of the Interstate Commerce Commission accounting system. Two methods of accounting for this material are in use. In one method the material is priced at prevailing prices and in the other it is priced at the amount which the plant has been charged. Both of these methods introduce accounting difficulties where it is difficult to identify and price any particular piece of material. Study of this problem was recommended in order that a satisfactory method that could be used by all might be developed. An extended discussion of the subject took place during which Chairman Cragg, J. W. Howatt, Saint Paul, Minn.; P. J. Weirich, Monroe, Wis.; O. T. Van Cleave, Terre Haute, Ind., and John King of Puyallup, Wash., contributed their ideas.

The next subject was "Destruction of Records," by W. L. Lemon, auditor of the Lincoln Telephone and Telegraph Co., Lincoln, Neb. Mr. Lemon discussed the matter of keeping old records for long periods of time on account of commission requirements and suggested some records which might be destroyed without causing difficulty if the regulations permitted such destruction.

The final subject was a paper on "Stub Accounting" by L. R. Welliver, auditor of receipts of the Tri-State Telephone and Telegraph Co., Saint Paul. Mr. Welliver illustrated the method and the manner in which it operates by passing samples of the forms used. Many questions were answered in the discussion following this paper. Following this paper the meeting adjourned.

Exhibits a School of Science

Independent Convention Makes Fine Showing

Chicago, Ill.—No revolutionary improvements made their appearance in the exhibition of telephone and radio equipment which was one of the big features of the Independent convention. There was, however, conspicuous evidence of the work of Independent engineers in further refining the plant equipment, and among the supply and construction material people plenty of proof that money-saving methods were sure of a warm welcome from telephone men.

One of the noticeable features of the telephone manufacturers' displays was the character of the radio equipment these people made. It was quite plain that the most desirable radio equipment is that made by the telephone men, for their standards of manufacture are so high that each bit of any radio device made by these factors shows the care in choice materials and skill in workmanship that is inculcated into men whose manufacturing policies were established by the niceties of switchboard and telephone instrument work.

One display that afforded a good opportunity to demonstrate how quickly telephone companies take to ideas that hold a definite promise of betterment in work was that of the National Cable Compound Co. Stephen H. Isom ("Steve Himself"), president of the company, by means of a rather complete check-up of convention attendance, determined that 42% of the operating companies represented at the convention were users of Ever-Protect Cable compound. Isom was assisted at the display by K. K. Drane of the company.

One of the interesting details of the Ever-Protect showing was the method of application now being used by many of the Ever-Protect customers.

The anchor people were on the job full force, and, although there were no new developments in anchor construction shown at the convention, the anchorites put in their good licks in furthering the gospel of staunch construction.

The Chance Co. with its Never-Creep greeted the visitor to the big room of booths. In addition to the samples of the Never-Creep with its patented Thimbleye, the Chance folks displayed back truss rods, brackets, the Chance lineman's wrench and lightning arresters. On the job for the company were A. B. Chance, Jr., J. J. Milligan and Denton Palmer.

"Happy Jack" Crawford, from whence came the now generally accepted dope that "it ain't gonna rain no mo'," headed the Everstick Anchor's sales representatives at Chicago. M. Blackburn and H. F. Fisher with Hap made up the crew. A new tamping bar, the Everstick cable ring, the Davis lineman's chair and the A. T. and T. Co. thimbleye rod were shown together with the Everstick anchor.

The Harrah Mfg. Co., represented by C. P. Harrah, staged a demonstration of the Handyman combination tool for stretching guy wires, messenger and cable, straightening and pulling poles.

Runzel-Lenz Electric Mfg. Co. marked the beginning of its twenty-first year by showing a full line of telephone and switchboard cords, with the principal feature being the new R-L moisture-proof tinsel switchboard

(*Continued on page* 38.)

Iron Wire in Telephone Work

Properties of Iron Wire for Telephone Service Are Presented—Manufacturing Methods—Proper Clearance from Trees and Foreign Wires Is Important

By P. KERR HIGGINS

In the previous article we discussed upon aluminum wire very briefly for the reason that its use in telephone work has been very limited. One of the readers of the TELEPHONE ENGINEER asks for information regarding the relative properties of aluminum and copper. I find in my files the following table which may be of use to those desiring this information.

Properties of Aluminum and Copper.

	Aluminum.	Copper.
Conductivity (for equal sizes)	.50 to .63	1
Weight (for equal sizes)	.33	1
Weight for equal length and resistance	.48	1
Price—Alum., 29c; cop., 16c (bare line wire)	1.81	1
Price (equal resistance and length bare line wire)	.868	1
Temperature co-efficient per degree F.	.002138	.002155
Resistance of mil-foot (20c)	18.73	10.5
Specific gravity	2.5 to 2.68	
Breaking strength (equal sizes)	8.89 to 8.93	

Making of Iron Telephone Wire

Iron telephone wire must be made with extreme care and uniformity. The production of a satisfactory wire for this purpose demands a high state of perfection in the art of steel making and wire drawing. The reason for this is found in the exacting requirements of telephone wire in actual service. It must be of such composition that it fulfills perfectly the principal function of its use, namely the transmission of electrical currents. It must possess great tensile strength and yet have as little weight as is practicable. It must be low in cost.

Low cost has given iron wire a very prominent place in the construction of present day telephone and telegraph lines. However, as the demands of the service continue to call for higher efficiency in transmission, it may have to give way to some extent in the coming years in favor of the higher conductivity metals which have been described in previous articles. In addition to the physical requirement of adequate strength, a satisfactory wire for telephone purposes must have high electrical conductivity. In this connection, it might be well to state that the cause of the lower efficiency of iron wire is due principally to higher resistance. High resistance in the wire calls for higher power at the transmitting station to supply the additional power lost in the line, if the volume of transmission is to be maintained. One of the convenient advantages of iron wire is that it is less liable to damage by careless workmanship.

All wire used in telephone work must be such that it will not stretch too much in the summer, or contract too much in the winter, and must have tensile strength enough to withstand the loads due to sleet, ice, snow and wind. Unfortunately iron and steel have a strong affinity for oxygen and other chemicals which may be in the air due to local conditions, and if unprotected from these, rapid oxidation known as rusting occurs. The sulphur in smoke from factories and at railroad crossing is especially destructive to the iron wire. The common method of protecting iron is by galvanizing, which must be absolutely uniform in order to obtain a high degree of protection against the corroding influences. Galvanizing consists in covering the iron with a layer of pure zinc spelter.

In the production of galvanized iron wire there must be the most careful selection of the materials used, together with the best equipment and processes and the highest degree of skill and experience from those responsible for its manufacture. The raw materials should be carefully selected, tested and the proper proportions placed in the melting furnace; the time and degree of heating must be carefully watched by experienced men. When the metal is molten, it is poured into ingots, which are then rolled into billets. The billets are rolled into rods and the rods are drawn into wire which is then thoroughly cleaned and galvanized. Each bundle of wire must then be subjected to an exhaustive series of electrical and physical tests so as to remove any possible doubt as to its quality. The galvanizing test is now made to determine if the zinc coating is continuous, elastic and of sufficient thickness to meet the specifications. This test should be a chemical, and not a visual test. The value of iron wire for telephone purposes is dependent largely upon the galvanized coating, hence the thickness and grade of galvanizing, and not its color is the determining factor.

Specifications for Galvanizing Tests

The following specifications give in detail the tests to be applied to galvenized material. All specimens should be capable of withstanding these tests.

A. Coating—The galvanizing shall consist of a continuous coating of pure zinc of uniform thickness, and so applied that it adheres firmly to the surface of the iron or steel. The finished product shall be smooth.

B. Cleaning—The samples shall be cleaned before testing, first with carbona, benzine or turpentine, and cotton waste (not with a brush), and then thoroughly rinsed in clean water and wiped dry with clean cotton waste.

The samples shall be clean and dry before each immersion in the solution.

C. Solution—The standard solution of copper sulphate shall consist of commercial copper sulphate crystals dissolved in cold water, about in the proportion of 36 parts, by weight, of crystals to 100 parts, by weight, of water. The solution shall be neutralized by the addition of an excess of chemically pure cupric oxide (CuO). The presence of an excess of cupric oxide will be shown by the sediment of this reagent at the bottom of the containing vessel.

The neutralized solution shall be filtered before using by passing through filter paper. The filtered solution shall have a specific gravity of 1.186 at 65 degrees F. (reading the scale at the level of the solution) at the beginning of each test. In case the filtered solution is high in specific gravity, clean water shall be added to reduce the specific gravity to 1.186 at 65 degrees F. In case the filtered

solution is low in specific gravity, filtered solution of a higher specific gravity shall be added to make the specific gravity 1.186 at 65 degrees F.

As soon as the stronger solution is taken from the vessel containing the unfiltered neutralized stock solution, additional crystals and water must be added to the stock solution. An excess of cupric oxide shall always be kept in the unfiltered stock solution.

D. Quantity of Solution—Wire samples shall be tested in a glass jar of at least two inches inside diameter. The jar without the wire samples shall be filled with standard solution to a depth of at least four inches. Hardware samples shall be tested in a glass or earthenware jar containing at least one-half pint of standard solution for each hardware sample.

Solution shall be used for not more than one series of immersion.

E. Samples—Not more than seven wires shall be simultaneously immersed, and not more than one sample of galvanized material other than wire shall be immersed in the specified quantity of solution.

The samples shall not be grouped or twisted together, but shall be well separated so as to permit the action of the solution to be uniform upon all immersed portions of the samples.

F. Test—Clean and dry samples shall be immersed in the required quantity of standard solution in accordance with the following cycle of immersions:

The temperature of the solution shall be maintained between 62 and 68 degrees F. at all times during the following tests:

First: Immerse for one minute, wash and wipe dry.

Second: Immerse for one minute, wash and wipe dry.

Third: Immerse for one minute, wash and wipe dry.

Fourth: Immerse for one minute, wash and wipe dry.

After each immersion the samples shall be immediately washed in clean water, having a temperature between 62 and 68 degrees F. and wiped with cotton waste.

In the case of No. 14, galvanized iron or steel wire, the time of the fourth immersion shall be reduced to one-half minute.

G. Rejection—If after the test described in section "F" there should be a bright metallic copper deposit upon the samples, the lot represented by the samples shall be rejected.

Copper deposits on zinc or within one inch of the cut end shall not be considered causes for rejection.

In case of a failure of only one wire in a group of seven wires immersed together, or if there is a reasonable doubt as to the copper deposit, two check tests shall be made on those seven wires and the lot reported in accordance with the majority of the sets of tests.

The equipment necessary for the test herein outlined is as follows:

Commercially pure copper sulphate crystals.

Chemically pure cupric oxide (CuO).

Running water.

Warm water or ice as per needs.

Carbona, benzine or turpentine.

Glass jars at least 2 inches inside diameter by at least 4½ inches high.

Glass or earthenware jars for hardware samples.

Vessel for washing samples.

Tray for holding jars of stock solution.

Jars, bottles and porcelain basket for stock solution.

Cotton waste.

Hydrometer cylinder 3 inches diameter, by 15 inches high.

Thermometer with large Fahrenheit scale correct at 62 and 68 degrees.

Hydrometer correct at 1.186 at 65 degrees F.

Filter paper.

Grades of Iron Wire

Iron wire is usually put up in one-half mile coils, the weight of which depends upon the size of the wire. In commercial practice, several grades of iron wire are found. These grades are usually known as "B," "BB" and "EBB" which mean "Best," "Best-Best," and "Extra Best-Best." It might be well to note that "Best" wire should never be used in telephone work, but "BB" is very popular, and if made by a reliable manufacturer gives good results. These are arbitrary terms, adopted many years ago, and at the present time have no special significance in themselves. "BB" is the most popular with telephone men. The Extra BB has a higher conductivity than the others, and possesses great toughness and strength. This grade is very popular for telegraph lines. There is no difference, however, in regard to the requirements as regards galvanizing.

The resistance of pure iron is assumed to be 57.06 ohms per mil-foot and its weight is 4,217.9 pounds per mile ohm. Commercial wire is assumed to have a conductivity of 96.6 per cent for the large sizes, and 97.3 for the smaller sizes when compared to pure iron. The breaking strength for all sizes is approximately 45,500 pounds per square inch.

In some cases where great tensile strength is necessary, steel wire is used. This material running as high as 6,000 pounds per mile ohm, has not as high a conductivity as the iron, but has greater tensile strength, the breaking strength being 60,000 pounds per square inch. Cast steel which has a breaking strength of from 150,000 to 200,000 pounds per square inch, has a resistance of nearly 12,000 pounds per mile ohm.

The following table gives some of the properties of double galvanized telephone wire.

No.	Diam., in ins.	Weight in lbs. per mi.	Put in bundles of	Approximate breaking strain in lbs. E. B. B.	B. B.	Steel.	Average resistance in ohms at 68° F. per mile. E. B. B.	B. B.	Steel.
6....	.203	590	⅛ mi.	1,620	1,782	1,998	8.70	10.19	12.04
8....	.165	390	½ mi.	1,140	1,254	1,406	12.38	14.47	17.10
9....	.148	314	½ mi.	960	1,065	1,184	14.69	17.19	20.21
10....	.134	258	½ mi.	780	858	962	18.08	21.15	25.00
11....	.120	206	½ mi.	642	706	792	21.96	25.70	30.37
12....	.109	170	½ mi.	495	545	611	28.48	33.33	39.39
14....	.083	99	½ mi.	288	317	355	48.96	57.29	67.71

Also see Wire Tables (H. H. 10-20), TELEPHONE ENGINEER, October, 1923.

At a temperature of 68°F the resistance in ohms of one mile of any size multiplied by the weight in pounds of one mile should not exceed 4,800 for EBB, 5,600 for BB, and 6,500 for steel.

Those desiring to investigate further the subject of manufacture, and the processes of corrosion of iron wire should consult Bulletin No. 239 of the United States Department of Agriculture by Dr. Cushman which will prove very interesting and instructive. A summary by Ralph Raymond appeared in TELEPHONE ENGINEER, June 1909, Vol. 1, No. 6.

The following specifications for EBB line wire may be found useful.

Extra BB Iron Wire—All extra BB iron wire shall conform to the standard specification, which is as follows:

1.—The wire shall be soft and pliable, and capable of elongating fifteen (15) per cent without breaking, after being galvanized.

2.—Great tensile strength is not necessary, but the wire shall not break under a less strain than two and one-half (2½) times its weight in pounds per mile. Tests for tensile strength can be made by direct appliance of weight, or by means of a single lever.

3.—Tests for ductility shall be made

as follows: The piece of wire shall be gripped by two (2) vises six (6) inches apart and twisted. The full number of twists must be distinctly visible between the vises on the six-(6) inch piece. The number of twists in a piece of wire six (6) inches in length, is not to be under fifteen (15).

4.—The electrical resistance of the wire in ohms per mile at a temperature of 68 degrees, Fahrenheit, must not exceed the quotient arising from dividing the constant number 4,800 by the weight of the wire in pounds per mile.

5.—The wire shall be cylindrical and free from scales, inequalities, flaws, sand, splints, and all other imperfections and defects. Each coil must be warranted not to contain any weld, joint or splice whatever in the rod before drawn.

6.—Whenever possible the wire shall be obtained in coils, all of one piece. If this cannot be obtained the supply of wire shall be furnished with two (2) pieces only to the coil, joined by the ordinary twist joint, and carefully soldered. It should be stated whether there will be one (1) or two (2) pieces in each coil.

7.—The wire shall be well galvanized and capable of standing the following tests: The sample shall be immersed in a saturated solution of copper sulphate for one (1) minute and then wiped dry. This process shall be repeated three (3) times. If, after the fourth (4th) immersion, there should be a copper deposit on the sample or the galvanizing should have been removed, the lot from which the sample is taken should be rejected.

Life of Iron Wire

From the experience of a number of telephone companies, it appears that the life of iron wire under some conditions is as short as one year, while under the most favorable conditions it may be twenty-five years or longer. Classifying roughly this experience would indicate that the life of iron wire is as follows:

Near blast furnaces or smelters or on the sea coast	1 year
In large cities where soft coal is used or near the sea coast	3 to 5 years
In towns where there is little soft coal smoke	5 to 15 years
In country districts where there is little or no smoke	15 to 25 years

It would therefore seem advisable in hazardous locations such as indicated above and also at railroad crossings, to use copper clad or copper wire in preference to iron or steel wire.

Weatherproof Wire Data

In addition to using bare iron wire for open wire work, weatherproof iron wire is also used where an insulated conductor is necessary, and the following table gives data pertaining to the American Brand Weather Proof Iron Wire, double galvanized:

Size B. W. G. Gauge.	Weight per mile lbs. Dbl. Brd.	Tri. Brd.	Bare approx. wt. in lbs. Per 1000 ft.	Per mi.	Diam in miles.	Approximate breaking strain in lbs. Ex. B. B.	B. B.	Steel.	Resistance per mile (International ohms at 68° F. Ex. B. B.	B. B.	Steel.
4	870	930	153	811	238	2,028	2,271	2,433	5.80	6.91	8.00
6	671	740	112	690	203	1,475	1,652	1,770	7.97	9.49	11.02
8	470	525	74	390	165	975	1,092	1,170	12.05	14.36	16.71
9	405	450	60	314	148	785	879	942	14.97	17.84	20.70
10	350	400	49	258	134	645	722	774	18.22	21.71	25.29
12	225	260	32	170	109	425	476	510	27.65	32.94	38.23
14	145	175	19	99	83	247	277	297	47.48	56.56	65.66
16	100	125	12	63	63	.....	.....	.....	79.36	87.30	103.17
18	68	89	8	42	51	.....	.....	.....	98.03	130.95	154.76

Proper Sag for Line Wires

On account of the fact that wires expand at high temperature the temperature must be taken into account in stringing wires. If wires strung in the summer are stretched too tightly, they are liable to break in the winter. on account of contraction. In addition to the temperature effects, the actions which occur in a span under load are very complicated. For a span of given length the stress in the wire diminishes as the sag increases. Hence, owing to the elasticity of the wire when it is subjected to any load such as sleet, it stretches, and the increase in length, due to this stretch allows it to sag more than before. This increase in the sag tends to relieve the load. A condition of equilibrium is soon reached where all the stresses are balanced. The term sag indicates the amount which a wire falls at the center of a span when its points of suspension are at equal height. Regardless of how tight the wire may be stretched, there is still some sag in the center. The following tables gives some of the allowable sag in wires:

For the ordinary span of 130 feet, the specified sag at 60°F is 7 in. Due to contraction this decreases to about four inches at zero F. The stretch of one percent is sufficient to allow the sag to increase to six or seven feet before the wire breaks. The specified sags are such that the wires under the loads, due to wind pressure and sleet have about the same factor of safety as the pole lines.

If a wire is stretched beyond a certain point, it is said to have reached its elastic limit. If the stress on the wire is not too great, then the elasticity of the wire remains and will assume its former sag when the stress is removed. If wire is stretched beyond its elastic limit it will never return to its former sag. If a greater sag than that indicated in the table is given to the wires, they will swing in the wind, especially in warm weather and may cause shorts and crosses. In determining the sag we should not use our own judgment, but rather be guided by the results of experiments as shown in specifications and the table given above. As a general rule all wires on each cross arm should hang at the same level unless they are of different metal and different gauges. New wires strung on an old pole lead should be given the same sag as the present wires, provided that sag is according to specifications. If not then the old wires should be properly regulated before stringing the new wire.

Temperature Fahrenheit.	Span 75 ft. Sag.	Span 100 ft. Sag.	Span 115 ft. Sag.	Span 130 ft. Sag.	Span 150 ft. Sag.	Span 200 ft. Sag.
—30	1 in.	2 in.	2½ in.	3½ in.	4½ in.	8 in.
—10	1½ in.	2½ in.	3 in.	4 in.	5 in.	9 in.
10	1½ in.	3 in.	3½ in.	4½ in.	6 in.	10½ in.
30	2 in.	3 in.	4 in.	5½ in.	7 in.	12 in.
60	2½ in.	4½ in.	5½ in.	7 in.	9 in.	15½ in.
80	3 in.	5½ in.	7 in.	8½ in.	11½ in.	19 in.
100	4½ in.	7 in.	9 in.	11 in.	14 in.	22½ in.

For No. 14 N. B. S. copper allow 2 ins. more sag.

Tying-In Wires

This is extremely important, and much maintenance expense could be avoided if greater care was taken in the proper tying-in of wires. Many of the breaks in copper wire after it has been strung are due to carelessness in this respect. In twisting the tie wires around the line conductor, sufficient heat may be generated slightly to anneal (or soften) the line wire and thereby reduce its tensile strength. In practice this is commonly spoken of as "burning the wire." This must be carefully avoided. Tying-in also has a tendency to kink the main conductor, and the lineman's tools damage the skin of the wire which has the same result.

The tying-in of iron wire produces practically the same results except that the twistings, tends to cause the galvanizing to scale and thus its protection effect is lost. Each line wire should be tied to its insulator with tie wire of the same size and material as the line wire. On straight lines, the ties are placed on the inner side of the insulator, excepting the two wires next the pole which are placed on the outer side to give more clearance. On curves and corners the line wires are so placed that the strain draws them against their insulators. In the case of copper wire, one side of the tie wire passes over the line wire and makes five complete turns, and on the other side passes under the line wire and makes five complete turns. Tie wire for copper lines must be soft copper wire, thoroughly annealed or burned. Great care must be taken in handling copper wires not to nick or break the skin of the copper wire with the pliers or connector which is frequently done in cutting off the ends of the tie wire. When tying in twisted pair, short pieces of wire of the same kind as the twisted pair are used.

Dead-Ending.

Line wires are dead-ended on the last insulator, for the purpose of connecting them to the substation instrument or to a cable terminal. They may also be dead-ended at test connector poles for testing purposes. The method used in dead-ending the copper line wire requires the line wire to be first slipped through a half length copper double tube sleeve, then wrapped once around the insulator and finally run back through the half sleeve, which is then given one and a half twists with the lineman's connectors. Where the iron wire is dead-ended, the wire is simply passed once around the insulator and twisted from five to seven times upon itself, the twist beginning at a distance of about two inches from the insulator.

Test Poles

Test poles are provided where necessary on a long line to afford means of opening the line for testing purposes on rural and toll lines. The line wires are dead-ended both ways on a double groove or transposition insulator, the short ends of the wires being brought over the top of the insulator where they are connected by means of a test connector, preferably of composition metal, such as brass.

Proper Clearance of Wires

One of the prominent causes of trouble and poor telephone service is failure to keep the wires clear from trees and foreign wires, especially the former. It is very important that the running of wires through trees should be avoided wherever possible as the constant leakage, especially in damp weather, due to the contact with the leaves and branches, very materially impairs the service. This is especially noticeable on common battery plants. As a matter of fact nothing foreign should be allowed to come nearer the telephone wire than eighteen inches on all sides. Where it is impossible to avoid trees, every effort should be made to secure proper trimming permits. Where this is not possible, either lead encased cable or insulated tree wire should be used. After trimming, remove all the brush and debris of every kind as soon as possible. This is done either by burning on the spot or carrying away to some ravine. All telephone wires below power or high tension lines or cables should clear them by a vertical distance of not less than four feet. The best practice is to have the power circuits run over and above the telephone wires as they are less liable to break. At trolley crossings the minimum clearance is ten feet.

Tree Trimming

It is impracticable to give any detailed method of trimming the many varieties of trees. However, the following instruction may help the lineman doing this work. "When a branch is to be cut off, the proper place to do so is where the branch leaves the trunk, where there is usually a prominence called the shoulder. At this point, wounds are more quickly healed. Frequently a branch has been cut a few inches from the trunk leaving a stub that in time rots away, forming a channel through which fungus spores are carried to the heart of the tree. Cut limbs off with a saw and not with an axe. When a branch is cut there is a tendency for the wood and bark to split down or peel for a foot or more, making a wound that will retard the growth of the tree, or even cause it to die. In case of very large limbs, it is well to first cut the limb off a foot or more from the trunk and then the stub can be removed without danger of bark splitting, or the same result may be obtained by a small undercut with a saw at the point where the limb is to be cut off. After the limbs have been removed, the wound should be given a coating of coal tar or some other preservative to prevent the entrance of germs or spores, and to encourage the bark to grow and close the wound. Trees should be trimmed in such a way as not to destroy their symmetry by cutting out wedge shaped portions or notches in the tops or sides. Tops of trees should not be trimmed flat, leaving sharp edges around the sides. Very light trimming should be done with a tree trimmer, avoiding climbing the trees where possible to do so. It is necessary to do more or less trimming during the entire year. However, heavy trimming should be avoided as much as possible during the spring and early summer months when the sap is flowing. This can best be done during the fall and winter months when the tree is dormant, or in the early fall when the sap is thicker."

The above instructions apply principally to the finer varieties of trees, especially in the cities and towns, but even in the country, it would be well for the average lineman to take a little more care when trimming trees and respect the appearance of what is left. By doing so he would make it much easier either for himself or the next man to secure trimming permission.

District Meetings Boom State Associations

Chicago, Ill. — Frequent district meetings have proved the biggest factor in promoting the progress of state telephone associations, according to the concensus of the state association executives who met during the U. S. I. T. A. convention.

The convenience of the district meetings, their intimacy, and the opportunities afforded for effective local newspaper publicity, all help to make these group meetings worth while.

Financing the state association in some cases is proving pretty much of a problem for the state chiefs who want their associations to function in the most complete and practical manner, but the matter seems to be one of salesmanship of the association principally, judging from the successful experience related by Jay G. Mitchell of the Illinois association.

Commission Views Regulation

Judicial Functions and Establishment of Proper Service Standards Outweigh Enforcement Work of Commissions—Outline of Commission Operations

By LEWIS E. GETTLE
(Chairman, Wisconsin Railroad Commission)*

The point of view of the public and of the State Commission regarding regulation of telephone companies is in many respects identical. The public sees the importance of proper control of rates and of capital issues, and, in general, it realizes the value of adequate and satisfactory service. The public, however, it seems to me, has over-emphasized the relative importance of the rate situation as related to public regulation and fails to comprehend the very important part which regulation plays with reference to the standard of service, both as to quality and extent. There are probably more people who know the Railroad Commission of Wisconsin by the name of "Railroad Rate Commission," than there are who know it by its correct title. In the early days of public regulation the rate situation was always emphasized, but the fact remains that any rate is too high for the poorest service, and that excellent service, judged solely by its value to the customer may be worth much more than the bare cost of furnishing it.

That the regulation of service, the establishment and maintenance—even imperfectly—of proper standards, and the education of many of the telephone people in the importance of proper service, has not been a simple matter, may be judged by some of the facts relative to the telephone situation. In Wisconsin we have a record, which is undoubtedly incomplete, of 983 telephone companies. I am told that in Minnesota the Commission has a record of about 2,000 companies, which record is probably also incomplete. The operating unit ranges all the way from one composed of three or four farmers who own a line connecting to a city exchange, up to units serving many thousand subscribers. The construction standards range all the way from grounded line rural construction on native poles with twelve or more subscribers per line, up to the highest grade of underground construction in metropolitan centers.

Enforcement, in the few cases where enforcement is necessary, of a proper service standard is not difficult with the company organized for furnishing commercial service and earning a profit as a result of its operations. It is exceedingly difficult to secure proper standards of service in many of the smaller units where the organization is loose, the sense of individual responsibility exceedingly small, and the amount of funds available limited by the assessment which stockholders are willing to place upon themselves. In many cases these smaller companies have not secured a quorum at their annual meetings for many years. In other cases the same directors had continued in office, because of the failure to secure a quorum, for so many years that they had virtually refused to accept any further responsibility and entire systems serving several hundred subscribers were left without any supervision, and without any actual organization.

Confronted by this state of affairs we have naturally not been able to place the standards of service throughout the telephone business in the state upon a plane as high as that prevailing, for example, in the gas business where by the very nature of the business, the commercial company has been the only one to carry it on. The improvement of service standards among the small mutually organized companies might be described as nine parts of education, encouragement, and co-operation, and one part of compulsion. Compulsion alone would be utterly futile for the simple reason that the companies are not able over night to change their standards, to place their methods on a modern basis, and to centralize responsibility as required for the continuance of a proper service standard. By taking up the job in a spirit of co-operation with the companies, and on the assumption that they would furnish good service if they knew how to do so, and were financially able, we believe that we have accomplished a considerable improvement in telephone service, although a great deal more remains to be done.

The standards for telephone service in Wisconsin were established by the Railroad Commission, on August 13, 1914. These standards are more than minimum requirements, but since they were decided upon after several hearings at which the telephone utilities gave evidence regarding telephone service needs, should be considered in fact as specifications for reasonable telephone service.

Since these standards were established the commission, through its general staff and service department engineers, has been suggesting, advising, co-operating with, and in rare instances threatening the operating utilities to bring the service to conformity with these requirements.

We have enjoyed this work, because the utilities have, in the main, welcomed the efforts of the commission to improve and standardize the service. It is true there have been some instances where the utility resented the so-called interference of the commission, but I do not know now of a single instance where the utility did not finally give evidence of co-operation after it was found that there was no intent by the commission to exact unreasonable requirements.

To Report Grades

For use in the service department, a system of grading all utilities with respect to conformity to the service standards has been carried on for several years. The telephone utilities have not been informed as to their rank in this system of grading for various reasons. The principal reason is that the system of grading was started the latter part of 1916, so that it was only well under way when the war conditions were upon us, and the telephone companies were kept busy enough keeping the balance out of the red without putting extra money into dividing lines and maintenance which was not absolutely necessary. However, with continued progress, we expect in the near future to summarize these grades, and will probably report the result to the utilities. We confidently expect to see managers of exchanges emulate each other and compete vigorously for a 90% grading, which is the passing mark for admission to the select class, i. e., the utilities where inspections are made only on complaint.

** An address delivered at the convention of the U. S. Independent Telephone Association.*

In all the utility service rules there is a requirement that accurate and adequate records be kept on all complaints on the service or operating methods. This rule we endeavor to enforce strictly because it is believed that the record of the complainants considered with the manner in which they are handled is a thermometer from which can be determined the temperature of public sentiment in favor or the coldness of public criticism of a telephone company.

It is our practice, therefore, to study carefully the nature of the complaints, the quantity of them, and the way they are handled, together with the practice of the company in attempting to eliminate the cause for certain characteristic complaints.

Many companies have worked out elaborate and efficient systems of tracing the cause of a complaint to its haunt and getting rid of the nuisance.

The Commission firmly believes that the utility should be given first opportunity to take care of any complaint, and it is our practice to determine before going into the particulars, that the matter has been unsatisfactorily handled by the utility. Otherwise the complainant is requested to give the utility a chance to straighten out the trouble.

The complaints brought to the commission are, of course, many and varied in character, extending from a plea for the removal of a discourteous operator to a demand for an investigation of the rates, rules and practices of a utility operating thousands of substations. These complaints may be clasified into about six groups relating to:

1. Transmision.
2. Exchange operation.
3. Substation operation.
4. Handling of trouble.
5. Extension of service.
6. Miscellaneous causes.

The first rule for telephone service is as follows: "Equipment and lines shall be so constructed and maintained as to eliminate all cross-talk and noise which unreasonably interferes with the transmission of messages for ordinary distances."

Here we have the standard for telephone service without the addition of any more rules, and if the commission was desirous of simply doing as it is required by law to do, viz., "establish standards of adequate telephone service for public utilities," then the other rules would be superfluous. The commission is desirous, however, of making conformity to the rules as easy as possible and most of the details of what is necessary to bring about "reasonably adequate service" are therefore made prominent in the other rules.

In the explanatory notes on this first rule emphasis is given to the necessity of making metallic grounded lines where cross-talk or inductive interference exists and further that reconstructed lines should be made metallic unless adequate service can be rendered by the grounded circuit.

A great deal of work has been done by the inspectors to impress upon the telephone companies the necessity of soldering all connections on the line and in the exchange, of securing on adequate grounds for the grounded return circuits, and of removing all accidental grounds.

I speak of these details to bring out the point that the commission is interested primarily, not in laying down arbitrary rules to govern the management of utilities, but to point the way to a gradual betterment of the service to the user. It was discovered very soon after the authority for the control of the telephone service was vested in the commission that a further duplication of telephone facilities in a community was not only a waste of money but actually detrimental to the service.

In consequence of this the anti-duplication law was passed by the legislature and the commission given the control over further extension of lines or exchange into territory already supplied with service. As a result of this these extensions have been made only when in the opinion of the commission the facilities present were inadequate or the needs of the subscribers in question could be much better served. In these cases, however, arrangements are usually made to take over the property of the utility which first gives the service at its fair present value.

Service Standards Inspire.

It is hard to determine what have been the actual benefits derived from the promulgation of service standards by the Commission, but we feel confident that there has been marked improvement. There were in Wisconsin hundreds of telephone companies operating with ground circuits only and there are still many lines, especially rural, which are so operated, but it is certain that there are no grounded circuits with more than thirty-six subscribers to the line as was the case some years ago.

The Commission has endeavored to enforce the standards by persuasion and logic rather than by penalty and I know of only one instance where it seemed necessary to impose a fine for non-compliance.

In carrying on this campaign for the betterment of telephone service, the Commission is very much indebted to the telephone associations and particularly the Wisconsin Independent Telephone Association. This association, through able men acting as officers and on the committees, has done most excellent work in standing back of the orders of the Commission and in bringing to the small telephone men a constant program of progress and improvement.

The Wisconsin Telephone Company, although confined largely in its operations to the more populous urban centers of the state, has, through its highly trained experts, contributed liberally to the working out of conformity to our standards of service. There has been practically complete co-operation between the Independent companies, the Bell Company and the Commission in lifting the whole telephone situation to a high plane of excellence in operation.

Satisfactory telephone service, however, is not entirely a matter of quality. Lines and equipment may be of the highest standard, employes may be competent, well trained and courteous, and yet the service may be inadequate because it is not sufficiently comprehensive. Despite all that has been said by those whose presence in the telephone business was the result of competition, in support of competitive situations, the present day concept of adequate telephone service is one that can be met only by a monopoly in the local field. Unless the telephone subscriber in a city or village can talk to every one of his neighbors, he has not complete telephone service. Where a business man must subscribe to the service of two companies in order to be in touch with the people within his trading area, his service is incomplete.

One of the important results, although possibly more or less an indirect result of public regulation, has been the tendency to eliminate competition and to unify local service. Sales, consolidations, and mergers have been the order of the day and as a result I think it is no exaggeration to say that we are within sight of complete elimination of competition in local telephone service and until that time comes local telephone service will not be the service to which its subscribers are entitled.

As a means of correcting the unfortunate situation resulting from local competition and as a means of securing as far as possible the benefits of unified service, laws have been passed in many states requiring physical connection of telephone systems where

conditions would warrant such connection. Physical connection was not a completely satisfactory solution of the question, however, because there still remained a wasteful duplication of exchange facilities and because the exchange of messages between competing systems was a slower service than could be obtained if all parties were subscribers of one company and because the physical connection laws could not require the companies to give this inter-company service without compensation in addition to their rates for their own exchange service. Physical connection laws, however, gave local Independent exchanges an opportunity to secure toll service even though at a slight differential in rates and improved their opportunity to compete because they could offer toll connections to their subscribers. A result of physical connection laws was to hasten the tendency toward elimination of competition and to bring about complete unification of local service in many localities. Physical connection laws were a means to the accomplishment of complete local monopoly in telephone service and because of the very results which they have accomplished will become obsolete in course of time.

As to Competition.

The Wisconsin statutes contemplate that a public utility should be free from competition in the community or communities in which it operates. The original public utility law provided that a second utility cannot be permitted to render service in a community already occupied by a similar utility without securing from the Commission a certificate of public convenience and necessity. This provision applies to telephone companies. The original public utility law, however, provided no limitation upon the free competition of two utilities already engaged in furnishing service in the same community or when later permitted by the Commission through a certificate of convenience and necessity to enter a municipality already receiving service from another company. There were a number of villages and cities where telephone competition existed at the time of the enactment of the public utility law. Naturally in such communities the service was unsatisfactory because business men in particular found it necessary to maintain a telephone of each of the competing companies in order to secure communication with their customers, also citizens were obliged to maintain two telephones if they desired to secure communication with all telephone users in the community. Such an arrangement not only results in poor service, but requires a duplication of investment with a largely increased cost of operation over what would be possible with a unified system. Fortunately many of these competitive situations have been eliminated through the purchase of one system by the other so that there are only a few remaining. The most recent consolidations of this character occurred in La Crosse, Janesville and Ettrick. Negotiations are at present under way looking toward the consolidation of the two exchanges at Galesville. There still remain, however, duplicate exchanges at several points.

The rural situation was very different in this respect from the situation in cities and villages. Telephone companies operating exchanges in the villages or cities naturally reached out to serve the rural residents whose principal trading was done at the exchange center. At a point about midway between villages some residents desired communication in one direction, some in the other, so that each company was encouraged to extend its lines further than the natural dividing line. This situation resulted in sharp competition and in a very considerable amount of line duplication. So serious became the situation that the legislature of 1913 enacted the so-called Anti-duplication Law which applies only to rural districts and which requires every telephone company proposing to extend its lines to notify the Commission and any other telephone company operating in the town of its intentions. The law provides further that the extension shall not be made if the Commission within twenty days determines that it is not required by public convenience and necessity. The Commission has construed the statute to mean that any extension requiring the setting of one or more poles is an extension within the meaning of the statute.

In practice the administration of this law is relatively simple. Upon the receipt of a notice of extension the commission writes to any other telephone utility operating in the town requesting it to advise promptly as to whether there is any objection on its part to the proposed extension. If no objection is filed by the competing utility, the Commission permits the extension to be made without further investigation. If, however, objection is filed by the competing utility, a hearing is held and the question of public convenience and necessity determined. In this manner the law does not seriously delay necessary extensions of service, and wasteful duplication is prevented.

In administering the statute the Commission has broadly taken the position that a utility should not be permitted to extend its lines in territory already occupied by a competing utility, unless it can be clearly shown that the utility already in the field is incapable of giving such service as will reasonably meet the needs of the subscribers concerned. In many cases the proposal to extend lines has resulted in proceedings under which the Commission has ordered the improvement of conditions or communication between exchanges. For example, a group of subscribers of the Western Wisconsin Telephone Company located southeast of the Galesville Exchange desired to discontinue their service with that company and secure direct connection with the Holman exchange of the Bangor Telephone Company. The proposed change would have rendered useless a considerable investment on the part of the Western Wisconsin Telephone Company, not only with respect to the lines in the territory in question, but also the pole line extending beyond that territory to the Galesville exchange. It developed that the subscribers concerned had experienced considerable difficulty in communicating through the Galesville exchange to patrons of the Bangor Telephone Company served by the Holmen exchange. The line between these exchanges over which such messages were routed was a subscriber line. Instead of authorizing the extension of the Bangor Telephone Company into this territory, the commission required the two companies to provide a clear circuit between the two exchanges which, with proper maintenance, will provide reasonably satisfactory communication between neighbors on the respective lines. Similar action has been taken in numerous other cases, but this situation is cited because it is rather typical.

Perhaps the most noticeable territorial conflict between telephone companies arises in the vicinity of growing cities. For example, the radius of influence of the city of Fond du Lac has been greatly extended by reason of highway improvements so that farmers now come to that city for their ordinary business transactions who formerly went to surrounding small villages. Recently a considerable group of subscribers of the Eden Telephone Company sought to secure direct connection by telephone with Fond du Lac. They very naturally felt that they should have the privilege of such direct connection when the rural company operating out of Fond du Lac was willing and ready to extend its service to their premises. It developed, however, that the Eden

Telephone Company would be seriously handicapped by the considerable loss of patronage involved and that the effect on the remainder of the patrons of the Eden Exchange would be an increase in rates or the complete abandoment of service. In other words, the Eden Exchange was so limited that to remove the territory in question from its service area would leave its exchange so small as to be practically incapable of self-sustaining operation. In such a case the Commission must naturally consider the convenience and necessities of the other patrons of the small exchange, as well as the convenience of those situated near the dividing line.

Commission As Arbiter.

However, numerous cases have developed where the transfer of a group of patrons from one exchange to another can be accomplished without jeopardizing the service of one or the other group of subscribers. In such cases the change has ordinarily been accomplished by the purchase of the portion of the system involved by the other company. It has frequently occurred that the parties were unable to agree upon a price and in such cases the Commission has acted as arbiter, making an appraisal of the property to be taken over. Before making such an appraisal, however, the Commission has uniformly insisted that a definite agreement be entered into between the two companies to sell and purchase upon the basis of the Commission's appraisal.

As a result of the passage of the Anti-duplication law and the consistent administration thereof by the commission, the practice of making extensions in competition has greatly decreased. Many telephone companies seeing the wasteful results of the duplication of lines, have established territorial boundaries as between themselves, making adjustments, selling or purchasing outlying lines in order to create a distinct boundary line. In many cases the territorial agreement provides that no extension will be made beyond the agreed line unless ordered by the commission. If under such circumstances subscribers beyond the line desire service the utility refers them to the commission and the commission upon receipt of a petition from one or more individuals institutes a proceeding on its own motion and determines whether the extension is or is not justified. Thus, in more recent years many of the cases before the commission relating to conflict of territory have been in the nature of proceedings on motion of the commission with respect to alleged refusal of service, instead of arising upon notice of extension by the utility.

The era of high prices resulting from the war emphasized sharply the need for economy in operation at every possible point. Telephone companies have been quick to recognize that rural service under these conditions cannot be maintained properly at reasonable rates unless the utility in the field has the greatest possible saturation of lines. In other words, duplication of lines inevitably almost doubles the cost of operation, since only partial saturation can be secured. This condition has led to the ironing out of many unsatisfactory situations which held over from the period before the passage of the Anti-duplication law. The administration of this statute has now reached the point when the principles are well established and where the cases arising are few because of the fact that telephone utilities not only are aware that wasteful duplication will not be tolerated, but also recognize that such duplication is distinctly contrary to their best interests.

It is undoubtedly difficult for many patrons living in border line territory to understand why they cannot pick and choose their telephone service, but looking at the situation broadly it becomes evident that the interest of the patrons is coincident with the interest of the companies in this regard. Adequate telephone service contemplates the saturation of the territory served so that neighbor can talk with neighbor and so that all in the community can communicate with each other. Moreover, the patron is interested in securing service at the lowest possible rate consistent with adequate service and as duplication necessarily increases the cost of operation, it has a direct effect upon the rates which the customer must pay.

My purpose has been to give a more or less comprehensive outline of the work of the Wisconsin Commission having to do with the progress and improvement of telephone service. I have not said and did not intend to say in this connection anything with respect to the regulation of the rates. My conclusions in this address, based primarily on the problems of service, might quite as well be reached by basing them on a discussion of rates and rate classifications. I assume that our experience has been largely duplicated in many other states that have undertaken telephone regulation. The experience of Wisconsin in this respect may be assumed, I think, to be typical of the great majority of states. It may, therefore, be said that the questions of the relation of the company to its patrons and the inter-relationship of the companies among themselves and the further relationship of the telephone companies to other utilities are uniformly measurably the same. Under these conditions it is almost self-evident that to co-ordinate the forces and influences having to do with efficient operation of a multitude of companies there must be regulation and supervision, and that such regulation and supervision must be in a large measure educational and inspirational. Such regulation can not be supplied by a far distant body that is not most intimately familiar with the topography of the country, the varied characteristics of the inhabitants to be served and the form and character of the units of operation.

Neighborly Intercourse Is Base.

Long distance or toll service is increasingly essential to modern social and business life. Telephone facility that does not extend beyond mere interchange of communication within a limited neighborhood no longer meets the demands of the most primitive community. Yet the whole tremendous telephone structure had its humble origin in the needs for intercourse with neighbors, the store, the church, the school—the whole community life. The telegraph largely supplied the rapid transit for distant messages. The expansion of the usefulness of vocal intercommunication into long distances measured by a few miles and then to thousands of miles yet represents comparatively the demands of the few. It is the luxury of the telephone business as the De Luxe transcontinental railroad train is in the railroad business. Local service and toll service of moderate distances are and will always be the bread and butter, and corn beef and cabbage, of the industry. Generally speaking telephone communication will always be overwhelmingly intra-community, inter-community and intra-state, rather than inter-state. The corporation or other form of organization carrying on this form of public service are creations of the state in which they operate. They are local institutions almost as much as schools are. As I have emphasized, these units of service are exceedingly diverse varying widely in size, form of organization, types of construction and methods of operation. The subscriber is primarily concerned with the right to service, as to who shall serve him, the character of the commodity he pays for and that he pay only what is reasonable. The operating company wants its territory protected from invasion and wants earnings that will bring it a fair net return on the value of its property. The people want to know that the company is honestly and fairly financed and that proper records are kept and are accessible at all times to the pub-

lic or its representatives. At least ninety-five per cent of these interests, obligations and demands are strictly local and are not at all or exceedingly remotely connected with interstate traffic.

Without state regulation the smaller companies would inevitably gradually degenerate into conditions in which regulatory laws originally found them. There would be duplication and wastefulness. Discrimination would run riot. The standards of service which have been so laboriously built up by trained experts through many years of effort would soon fall into chaotic ruins. Reserves required to be built up to protect the public in its service and investors in their investments would soon be dissipated. The harmonious relationship of the Independent companies among each other and with the Bell interests could not fail of destruction. I am satisfied that in so far as the federal government reached out its mighty arm to interfere with local regulation during the war period its interference brought only grossly unjust and unscientific exactions, inconsistencies and incongruities, remnants of which still occasionally are discovered only to provoke merited execration. The reports now required to the interstate commission are nothing but a huge pantomime, devoid of all value to anybody, expensive to the government at Washington and an unwarranted financial burden on the multitude of struggling small companies.

The telephone is a household necessity. It, more than any other mechanical agency, humanizes and socializes human existence. Working out its widest usefulness in perfection of saturation with the nearest approach to the value of personal vocal intercourse is an ideal towards which science and public spirit are working and the state commissions are not only contributing efficiently toward such purpose by scientific expert contributions, but more largely by a judicial supervision of the right relationship of consumers to the companies and the companies to each other.

Bell Vets in Big Reunion

Sprightly Gathering of Pioneers at Chicago

Chicago, Ill.—Ben S. Read, president of the Southern Bell and Cumberland companies, was chosen to succeed A. L. Salt, vice-president of the Western Electric, as president of the Telephone Pioneers of America, at the eleventh annual meeting of that association.

All previous attendance records were broken by the throng that was brought into Chicago on the six special trains the event demanded.

The total active membership of the organization now is 7,796, with a total of 33 active chapters.

F. A. Stevenson was elected senior vice-president of the Pioneers. He is the director of the Long Lines department of the A. T. and T. Company.

The three other vice-presidents chosen are: E. E. Berry, president of the Chesapeake and Potomac Telephone Company; D. P. Fullerton, vice-president of the Pacific Telephone and Telegraph Company, and W. R. Abbott, president of the Illinois Bell Telephone Company.

The executive committee picked for the next two years consists of E. K. Hall, vice-president, A. T. and T. Company; Miss Ida Krebs, cashier, Ohio Bell Telephone Company, and H. D. McDonald, commercial representative, A. T. and T. Company, Boston.

Thomas Watson, assistant to Alexander Graham Bell at the invention of the telephone, was elected an honorary member of the Pioneer Telephone Association of America. Mr. Watson is the man who heard the first sentence ever spoken over a telephone. In fitting commemoration of that event the committee appraising Mr. Watson of his election to membership in the association paraphrased the words of Prof. Bell's first message in their telegram to Mr. Watson. The telegram opened with the sentence: "Watson, we want you."

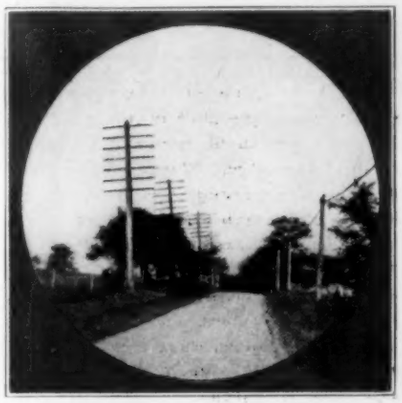
Talks were made by H. B. Thayer, president of the A. T. and T. Company; Mr. Salt; J. F. Henderson, commercial representative of the southern companies for the state of Texas; George Van Buren, commercial representative of the Pacific Telephone and Telegraph Company; and Miss Julia I. Dwyer, employment supervisor of the Northwestern Bell Telephone Company at Des Moines, Iowa, and W. E. Bell, president of the Theodore N. Vail Chapter of Chicago.

The big feature of the sight-seeing and entertainment was a visit to the Hawthorne works of the Western Electric Company.

Entertainment at the convention headquarters consisted of a dance every night, with moving pictures on Friday night and a special radio picnic on Saturday, an Illinois Bell show.

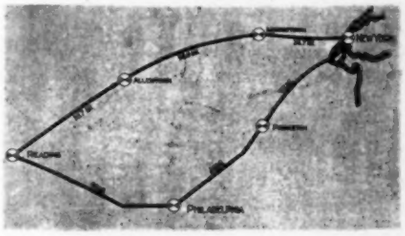
New Toll Cable Across New Jersey

The New York-Reading toll cable of the American Telephone and Telegraph company which was completed during the present year is described in a recent number of Long Lines. This cable provides additional facilities between New York City and



Old and new in New York-Chicago line. Cable on right.

Reading, Pa., to relieve the existing cable which is routed through Philadelphia. The cable crosses the Hudson River in one of the McAdoo tunnels and continues underground through the congested part of New Jersey to Morristown. From Morristown to Allentown, Pa., and on to Reading the cable is carried on pole lines on private right of way except



Upper line shows new line, New York-Reading.

through cities where underground conduit is necessary.

The pole line, in general is a 25-foot, Class B, butt-treated chestnut line with 110-foot spacing. The cable is a full sized cable containing 19 quads of 16 ga., 120 quads of 19 ga. and one quad of 22 ga. conductors from New York to Morristown. For Morristown to Reading it has 33 quads of 16 ga., 91 quads of 19 ga. and one quad of 22 ga. conductors. The 22 ga. quad is provided as a trouble tracer quad. Repeater points are located at Morristown and Allentown. The total length of the cable is 127 miles.

Public View of Regulation

A Study of Recent Tendencies in Commission Regulation and of the Public Attitude Toward Problems Involved — Some Views on Valuation, Depreciation and Reward for Efficiency

By C. O. RUGGLES

of the College of Commerce and Journalism, The Ohio State University

(Address Before the United States Independent Telephone Association)

We have seen in recent years a rather interesting shift in public opinion on the question of commission control of public utilities. When a large number of commissions were formed following the establishment of the New York and Wisconsin Commissions in 1907, these administrative bodies were very popular with the public. It is easy to understand why this was so. In most instances these newly created bodies brought about reductions in the rates of utilities.

In recent years there has been a right-about-face. The Commissions are no longer as popular as they were and in a number of the states there has been agitation to have them abolished. Indeed in some states they were abolished though the people in most instances rallied and created practically the same sort of a body under a slightly different name. The reason the commissions have been unpopular in recent years is not difficult to discover. The fundamental economic changes ushered in by the war lead many commissions to see that utilities deserved an increase in rates. This the public in many instances resented, hence the hostility toward commission regulation itself.

No question can ever be dealt with intelligently unless the fundamental principles underlying it are kept constantly in mind. The recent agitation to abolish state commissions, and to resort instead to municipal home rule, simply ignores the vital problems of practically all of our utilities as they now operate. It must not be forgotten that many of our utilities now operate over very large areas. This in turn means that there are an increasing number of economic and technical questions involved in rate making, depreciation, valuation, character of service rendered and in judging efficiency or inefficiency of management. To handle these questions intelligently and effectively there must be capable state administrative bodies; with staffs of technical experts, and these state commissions must cooperate with one another and with the federal government in exercising control over the area within which these utilities operate.

If a public utility serves fifty cities it is very difficult to determine which one of the fifty cities should do the "municipal home ruling." Take as a concrete case the East Ohio Gas Company. If one of the numerous cities in Ohio which it serves would pass an ordinance that provided for gas of 550 B.t.u.'s and another would pass an ordinance which called for gas of 500 or 600 B.t.u.'s, it is evident that the East Ohio Gas Company would face an impossible situation.

While the public can pass directly upon the merits of some questions, through the voting booth, there are many other questions upon which they cannot reach an intelligent conclusion. One can be in favor of the initiative, and referendum, and yet not be in favor of resorting to their use in controversies involving the technical and economic questions of public utilities. Even legislatures and city councils elected by the people are not capable of passing judgment upon many public utility questions, without the advice and assistance of persons familiar with the issues involved. The sooner the public appreciates that it is necessary to have strong public utility commissions, which can give consistent and sustained effort to the study of utility problems, the sooner will the best interests of the public be served. We are about to vote in Columbus on whether the people will sanction a certain gas rate. Obviously the people know nothing about the merits of the question and it is nothing short of an absurdity to ask them to vote on such a technical question. What can the public know about the necessity for a change in the telephone rates of a community. The only sensible and safe plan for them to follow is to delegate this problem to a commission so constituted as to secure the best possible consideration of all issues at stake.

The regulation of telephone rates is by no means as simple as the public thinks it is. There can be no fair regulation of these rates which does not give consideration, among other things to changes in economic conditions from time to time, to the manner in which depreciation is handled, and to valuation or the base upon which the rates are calculated. The level of rates is in turn vitally related to what is considered a fair rate of return, and the determination of what is a fair rate of return should involve the efficiency or the inefficiency of management. Obviously it is not possible within the limits of this paper to give more than very general consideration to some of the problems to which reference has just been made. Moreover, in what is about to be suggested, there is not space to comment upon the very substantial progress which a number of the state commissions have made along the lines under discussion. Emphasis will be placed in this paper on the need for greater emphasis on these phases of utility regulation, and for greater public support of the commissions which have blazed the way.

Telephone rates in the future will undoubtedly undergo changes which will make them more equitable. Much has been said and written about the telephone being subject to increasing costs. Telephone men know that the outstanding reason for this condition is the fact that they are called upon to render an increasing service at a fixed or flat rate. Surely a grocery store would be subject to increasing costs if a flat rate would be charged for admission and no limits were placed upon the size of the basket a customer could fill and carry away. It is hardly conceivable that the public will not consent to more equitable telephone rates once they thoroughly understand the problem. It is clearly up to the utility commissions to place the merits of telephone rate makings before the public and to revamp telephone rate schedules as rapidly as the commissions can carry the public with them. This is not to argue that a system of measured telephone rates should be adopted under any and all circumstances, but it does mean that telephone rate schedules should more nearly conform to the costs involved in rendering the service. Before the war the public de-

Keeping the Telephone Alive

Americans have learned to depend on the telephone, in fair weather or in foul, for the usual affairs of the day or for the dire emergency in the dead of night. Its continuous service is taken as a matter of course.

The marvel of it is that the millions of thread-like wires are kept alive and ready to vibrate at one's slightest breath. A few drops of water in a cable, a faulty connection in the wire maze of a switchboard, a violent sleet, rain or wind storm or the mere falling of a branch will often jeopardize the service.

Every channel for the speech currents must be kept electrically intact. The task is as endless as housekeeping. Inspection of apparatus, equipment and all parts of the plant is going on all the time. Wire chiefs at "test boards" locate trouble on the wires though miles away. Repairmen, the "trouble hunters," are at work constantly wherever they are needed in city streets, country roads or in the seldom-trodden trails of the wilderness.

Providing telephone service for this great nation is a huge undertaking. To keep this vast mechanism always electrically alive and dependable is the unending task of tens of thousands of skillful men and women in every state in the Union.

AMERICAN TELEPHONE AND TELEGRAPH COMPANY
AND ASSOCIATED COMPANIES
BELL SYSTEM
One Policy, One System, Universal Service

manded that installation costs and the costs for moving a telephone should be absorbed in the rate. Unfortunately this absurd plan was not completely eliminated by the war. This question, like many others in utility rate making, is not so much an issue between the public utility on the one hand and the subscriber on the other as it is an issue between the various classes of subscribers themselves. What a public utility must have is an aggregate revenue sufficient to meet all demands upon it. What the great body of consumers of a public utility ought to insist upon is that the aggregate revenue be collected without unfair discrimination among the different classes of consumers.

The utility is helpless in attempting to convince the public on many such questions. Take as a concrete case the attitude of the public toward the service charge. Even some of the public utility commissions notably those of Michigan and Missouri have hesitated to apply service charges in utility rate schedules because of the unpopularity of such a charge with the public. Most students of telephone rates will probably agree that the service charge should be used along with measured telephone service. At present there is too much reliance upon the less scientific minimum charge with such service.

It is clear that the public utility commission has a large order in the handling of the problem of depreciation of telephone property. Yet there can be no effective regulation of rates which does not take this subject into consideration. There are issues here which involve a proper coordination of Federal and State regulation. The extent to which the Federal Government should control the accounts of telephone companies including depreciation should depend, not upon the mere size of the telephone company, but upon the extent to which its business is interstate in character.

There is much difference of opinion upon the subject of depreciation and this paper cannot enter into the merits of these controversies. For our purposes it can be said that the problem must be handled in such a manner that the public utility is held to strict account and is not allowed to use in some other way what may be asked for under the head of depreciation. In the Report of the Committee on Public Utility Rates of the National Association of Railway and Public Utility Commissions for 1923 there is given a concrete case concerning depreciation in its relation to rates which is of interest in this connection. It appears that a certain utility through its board of directors had adopted a resolution reciting the fact that the life of a franchise under its terms would expire in a certain number of years, and that it would be necessary for the stockholders to receive a return of the capital invested during that period. The resolution then provided that 20% of the value of the property should be set aside in a depreciation reserve fund annually to be paid to the stockholders during the period in question. The company then proceeded to pay a 12% dividend, and in addition to pay from the depreciation fund another 20% in the way of a liquidating dividend. When confronted with the question as to the propriety of such proceedure the company contended that "past earnings" could not be deducted or taken into consideration in determining what constituted a just rate for the present and the future. While this is an unusual and exceptional case it does illustrate the principle involved, and as the Report of the Committee of the National Association of Railway and Public Utility Commissions pointed out, it illustrates the necessity of a strict supervision and regulation of the fund accumulated in the depreciation reserve account. There are probably many cases in which utilities do not know if they are making or losing money because they are not giving proper attention to the subject of depreciation. Some new utility companies which break into the field might hesitate to do so if they had a complete picture of what it would cost them to do business.

The suggestions which have just been made concerning the need of a closer scrutiny of the depreciation account, leads to the statement that in our commission regulation of utilities we have probably given undue attention to rates and the rate base and too little attention to operating expenses and to the character of the service rendered. If we ever come to government ownership of our important utilities it will probably not be because of the rates charged but will be because of the character of service given.

Many public utility managers do not like the idea of a commission attempting to regulate service. They say it amounts to a substitution of management for regulation, and this they believe would be fatal. No sensible man would argue that a commission should attempt to substitute management for regulation. But it does not follow from this statement that commissions should make no attempt to check up waste and inefficiency in operation, and to hold utility management responsible for its own mistakes.

It is not uncommon to have much controversy over certain items which are to be included or excluded in the valuation of a public utility, but we have not given sufficient consideration to the fact that inefficiency or waste in operation may be of even greater importance. For example, if an item of $100,000 is put into cost of operation which should not, under all reasonable circumstances, be included, it amounts to a difference in valuation or in the rate base of $1,250,000, if the rate of return is calculated at 8%.

From what has been said it would logically follow that if commissions are to penalize waste and inefficiency, they should also reward utility operators for economy and efficiency in management. Some persons maintain that such a program of regulation is all moonshine. They contend that commissions have not nor can they ever have the ability to decide when a public utility should receive an increased return for its economy and efficiency. No one will argue that it will always be a simple thing to carry out a program of regulation which shifts the emphasis somewhat away from rates to efficiency or inefficiency in management and to the character of the service rendered, but it appears well within the bounds of reason to argue that unless this can be done the regulation of the future will be tantamount to government ownership and operation itself.

The outstanding argument which is always advanced for private ownership and operation is that it gives opportunity for initiative and offers rewards which in turn bring about the maximum of economies. But if regulation is to bring all telephone companies for example to a dead level where does this initiative and this incentive to saving and economy come in? Unless a public utility company gives a higher rate of return to a telephone company which renders a first class service even though it will do so at less than an average or normal cost where will there be any incentive on the part of management to be efficient or to make savings in operation? If all possible economies are to be met with, a reduction in rates and in the rate of return and conversely if all inefficiency in management and high costs of operation are to be met by increases in rates utility management will have little concern either in an increase or a decrease in the costs of operation.

Another angle of this problem is the significance of the theory of valuation which is adopted by public utility commissions. As is well known to this body the courts beginning with Smyth v. Ames in 1898 have, at least until very recently, shown a preference for

(Continued on page 37.)

LINE AND DESK

AUTOMATIC TELEPHONE INTERFERENCE DETECTOR

The following is a description of a circuit to enable the attendant of an automatic exchange (Stronger type) to ascertain the circuit of any subscriber, who wilfully annoys any other subscriber in the system. The equipment necessary can usually be found around an automatic telephone exchange, and is quite easily installed.

Setting Up

1. Upon receipt of a call from a subscriber complaining of being annoyed by other unknown parties, the test clerk removes the heat coils from the line reporting and inserts the test shoe. The Relay Set is then placed in the spare position of the connector board in which the reporting telephone is connected, and one of the ten plugs of the Interference set is placed in the line jacks of each connector in the board.

Telephone Called

2. When the reporting telephone is called from any switch the ringing current rings the bell at the telephone and also operates the 87-D relay through the 1 M. F. condenser connected across the test shoe. The 87-D relay operates the B relay on the test desk through the contacts of 87-D relay, normal contact of release key, normal contacts of night key to ground. B operates and closes a locking circuit from battery, through 800 ohm winding of B, closed contact of B to ground through release and night keys. B also closes the lamp circuit through the night alarm relay, operating the buzzer. A 1000 ohm bell is bridged across the 87-D relay to signal the test desk in case the buzzer is turned off.

Relay Set in Connector Board

3. When B locks itself it also closes a circuit from negative battery through the windings of the two relays in the relay set in series, through the contact of B to ground, through the release and night keys. When these two relays operate they close 10 sets of contacts, closing the 10 circuits through 10 retardation coils, and 10 No. 1 receiver cords, connected to the line springs of the 10 connector test jacks. This holds all 10 connectors in an operated position, at the same time the lamp and buzzer on the test desk are calling the attention of the test clerk.

Observes Call

4. The test clerk operates the listening key and bridges her set across the called line through the ½ M. F. condenser. If the call is regular she presses the release button, opening the ground circuit and releasing all relays, thus removing the loop across the line windings of all connectors.

Tracing Call

5. Should the call prove to be one of the annoyance calls the test clerk goes to the connector board, observes the connector calling the number annoyed, places a slug in the upper springs of the cord plug, thus short circuiting the connector, presses the release button on the relay set and releases all other connectors. She can then trace the connection back to the calling telephone.

Night Key

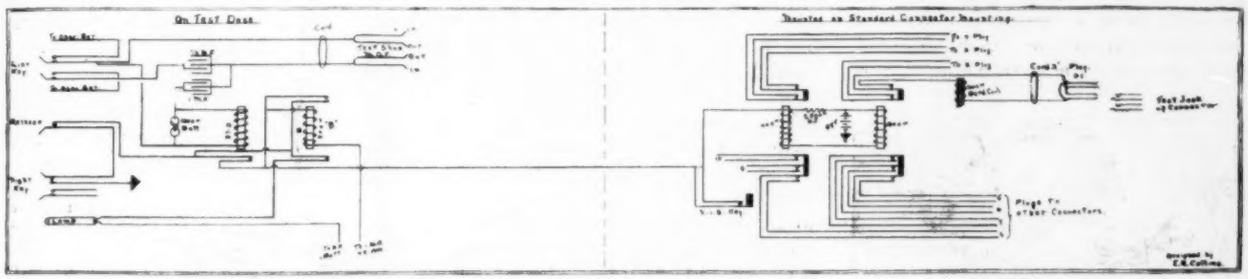
6. When there is no attendant at the test desk the night keys are pressed in thus making the detector set inoperative.

The relay set can be placed in any connector board by setting it in the spare or No. 11 position, from which the bank support has been removed.

Sparking at Contacts

7. A 2500 ohm non-inductive coil is bridged across the windings of the two relays of the relay set, to prevent sparking at the operating contacts.

—Contributed by E. R. Collins, wire chief, Manitoba Telephone System, Brandon.



This is the circuit that locates the joker who makes annoyance calls for automatic exchanges.

PROTECTION FOR CONDUIT AT RAILWAY CROSSING.

The development of high pressure locomotives has brought with it some additional hazards to cable and conduit, which cross railroads on bridges and viaducts where the clearance is small. Damage by steam, gas and hot cinders has occurred in such locations. A method of avoiding such difficulties employed by the New England Telephone and Telegraph Co., at Newton, Mass., is described in a recent number of Telephone Topics. At this place a twelve duct conduit is supported on a bridge directly over the tracks. In designing the support for the conduit, provision was made for cast iron blast plates which take the blast from the locomotive and thus prolong the life of the conduit. These plates are made in sections 8 feet long, 18 inches wide and ⅝-inch thick, and each section weighs approximately 275 pounds.

Cleveland, Ohio. — Approximately $60,000,000 will be spent during the next five years for new plant and equipment by the Ohio Bell Telephone Co.

Grounding Cable Sheath

A Telephone Plant Engineer Gives His Ideas on the Subject of Grounding Cable Sheath and Messenger —He Has Figures to Show How Trouble Is Reduced

By RAY BLAIN

It seems that there are still many who do not realize the advantages of having the lead sheath on aerial cable insulated from the ground. I have found from actual practice that lightning causes a minimum of trouble to this type of cable construction. That lightning does not cause trouble on this type construction seems reasonable, and is proven by the fact that when a high potential enters a cable over the conductors, if the sheath is grounded there is every possibility that a breakdown will occcur at some point where the insulation is weak, especially on a turn. If the sheath is insulated there is every possibility that the insulation of the conductors will hold and carry the charge to the protectors where it will be taken care of without injury to the cable.

Fig. 1.—Showing Sheath Insulation by dead-ending guys and messenger.

A large amount of the trouble on aerial cable systems is caused by electrolysis but is very seldom traced to that source. Two or more grounds on one cable sheath greatly increases the chances for electrolytic action. A loose connection on the return of an electrical system, such as loose bond on a street car track, between the two grounds will cause a current to flow into the cable at one ground and out at the other with the usual result. When the messenger is grounded and there are no insulated splices or FX boxes between the aerial and underground systems, there is in effect a double ground on the system. I believe that to avoid the possibility of trouble from electrolysis, it is best to have the sheath of all aerial cable insulated from the ground.

I will give as an example and proof, an exchange that was installed in 1918. At that time it was thought necessary to ground all messenger and cable sheath. As an experiment on this exchange the cable sheath was all insulated from the ground by dead ending all down guys and messenger on separate strain plates about twelve inches apart as shown in Fig. 1. Strain insulators were cut into all down guys. Insulated splices were installed on all cables to separate the aerial from the underground. Examples of the installation of these insulating joints are shown in Figs. 2 and 3. There is a little over 45,000 feet of various sizes of cable now in service, about one-fourth of which is underground. During a little over six years service the following is a total of the troubles on the entire system.

Bullet holes	4
Holes caused by lineman's spurs	3
Defective cable terminals	2
Terminals damaged by lightning	2
Sheath rubbing guy at corner	1

Only five out of the total of twelve cases of trouble could possibly be charged to the constuction methods. I believe that only five cases of trouble on a system of this size during a period of six years, proves beyond a doubt that the sheath on aerial cable should be insulated from the ground. Not one pair has been lost in either the aerial or underground.

There is not an FX box or pot head on the entire system. Both of which it is thought best to avoid as in most cases they eventually cause trouble. The insulated splices are much cheaper to install, neater, and answer the purpose just as well as an FX box under ordinary conditions. Not one of the many insulated splices on the system have ever caused any trouble.

A seventy-five pair cable provides trunk service from the exchange above mentioned. This cable runs under-

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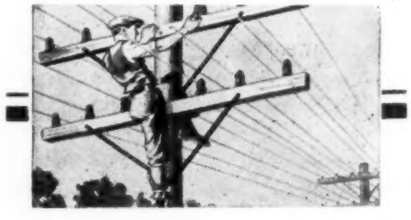
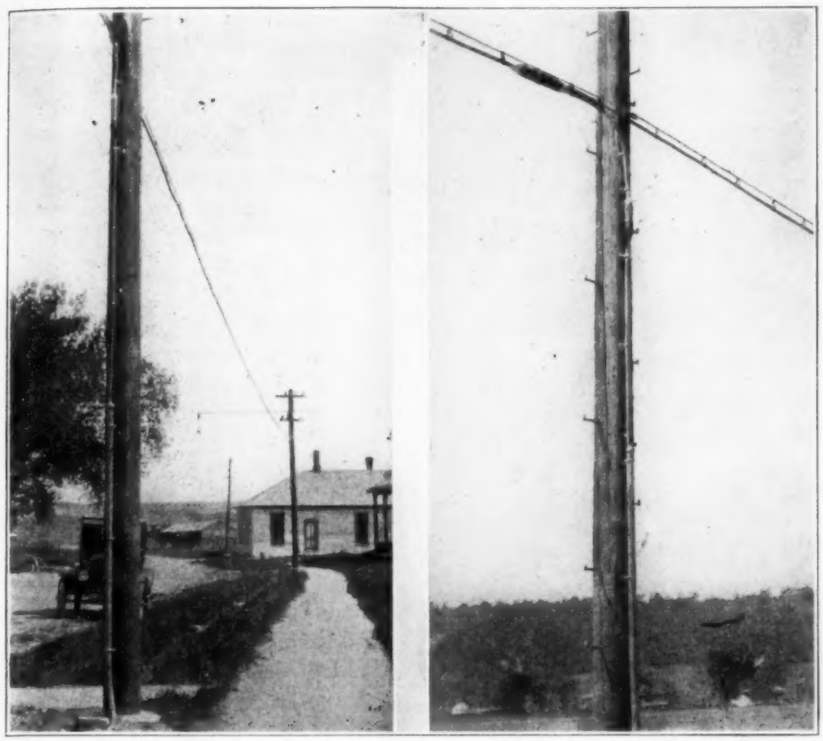


ground from our office about two blocks and then aerial for about two miles to a protected box where it connects with the other exchange cable and runs about one mile through this cable to their office. The sheath of the other exchange cable is grounded, and has been in trouble several times, while our part of the trunk cable which is twice as long, but with the sheath insulated has not had a single case of trouble on it. One time the cable of the connecting exchange crossed with a trolley and the sheath was burned through under each hanger for several spans, while the cable on our side of the box was uninjured.

When telephone cables are installed on joint pole lines with electric companies, it is permissible to insulate the cable sheath in the manner mentioned. One lighting company advised me that they instruct their linemen to always consider telephone cables as grounded, regardless of how well they are insulated. Should an insulated cable become crossed with a high potential circuit, it would of course be hot to ground, but I do not think that any damage would be caused to the telephone cable. I know of one case when such a cable become crossed with a circuit carrying twenty-three hundred volts a. c., and the cable was not damaged, whereas if it had a grounded sheath it would not only have been damaged, but likely the messenger burned down as well.

The National Electrical Safety code requires that all metal conduits, cable sheaths, frames, cases and hangers of equipment shall be permanently grounded except when guarded from accidental contact of unauthorized persons, or when eight feet or more from the ground. When a telephone cable is strung on light poles the strain insulators should be installed at least eight feet from the ground. It is believed that a cable insulated in this manner is far less dangerous than one that is grounded.

In a few cases due to inductive disturbance it may be necessary to ground a cable sheath. When this becomes necessary the cable should be securely grounded at one point and the sheath and messenger bonded together at frequent intervals. In all other cases insulate the sheath from the ground as well as possible, and I feel certain that you will be more than repaid in a very short time for the small additional expense of this type of aerial cable construction.



Fif. 2 and 3.—Examples of insulating splices.

ANSWER TO CALL FOR HELP —HOW HIGH RESISTANCE JOINT MAY BE LOCATED

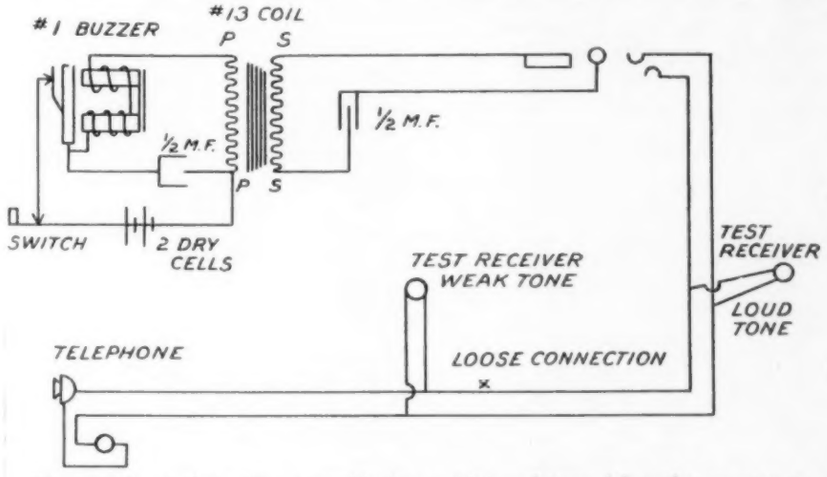
Troubles, such as the Indiana Lineman is looking for, are most easily found by using a testing current similar in character to the voice current, which made the presence of the high resistance noticeable. Such a current is very easily obtained with a buzzer made up of the following equipment:

1 No. 1 Buzzer, Echo on hinges.
1 No. 13 Induction Coil.
2 ½ M. F. Condensers.
2 Dry Cells No. 6.
1 Switchboard Plug.
1 Battery Switch.

These should be connected up according to the sketch, and the buzzer adjusted to as high a pitch as possible.

As soon as the trouble is noticed by the operator, she should at once kill the line by inserting a dead switchboard plug in the line jack. This will open the line so that ringing current from the subscribers magneto will have no effect on the trouble.

The troubleman should provide himself with an operator's head-phone, equipped with two flexible leads and test clips. Then, with the plug from the tone inserted in the line in trouble, he will proceed to listen on the line with his head-phone. When he has passed his trouble, he will notice the tone has almost entirely disappeared. Great care should be used, while testing, not to shake or disturb the trouble



The test circuit that will get trouble due to high resistance joints that go open to talking circuit.

condition. This method of testing will enable the troubleman to be certain he has located the trouble, and the repairing of same then is a simple matter.

The following is a list of some of the most common places for such troubles to occur:

1. Poor soldering on line jacks.
2. Poor soldering of M. D. F. jumpers.
3. Poor bolt contact in heat coil springs of M. D. F.
4. Defective fuse in U. G. cable box, or poor contact between pothead wires and fuse clips.
5. Poor soldering of cable jumper wires to iron line wires.
6. Poor soldering of iron to copper at railway crossings.
7. Poor soldering of drop wire to iron wire.
8. Drop wire broken under insulation where attached to the subscriber's premises.
9. Poor connections at sub station protector, or instrument.

From the above list it is evident that poor soldering is a prevailing sin among telephone men.—Contributed by E. R. Collins.

A PLACE FOR EVERYTHING AND EVERYTHING IN ITS PLACE

The first inspiration to fix up my store room came from one of my supervisors who said: "A place for everything and everything in its place." It made me think and on thinking I took action. The results are shown in the picture.

The two lower rows of glass jars are 1 pint fruit jars; the others are 1 quart. The small bins are about 6x6x8 ins., a convenient size so the hand can reach to the back. The larger bins are for larger articles as may be necessary for the locality. Some make the mistake of having the small bins too small to insert the hand, either for the articles that they contain or for cleaning. I place screws in the lower jars, beginning on the right with the smaller ones and following with the next in size and lengths. The pint jars hold enough for all ordinary uses, for one month, such as short length sleeves, small parts, protector blocks, micas, fuses, mouth pieces, milonite nails, short cords, diaphrams, receiver cranks, and such articles. The larger jars are for articles that are bulky and too long for the smaller jars. The advantage of using the jars lies in keeping the parts clean and free from dust, and where they can be readily seen for use and in checking up; also for neatness in appearance. Many have been the favorable comments from people coming into my office, which is in my store room, regarding the handy way in which I have things arranged.

The same plan is carried out on my tool box in the repair car. I have trays in this box and, in these trays I have about 40 tin cans (10 cent tobacco cans) painted black, with a label of the article they contain. A supply of all things needed for repairs or installing can be carried in a small space, with a minimum amount of weight, and in a few minutes each day I can refill any or all cans.

How "Doc" Cornman arranges his stock for convenience and economy. Inset—C. C. (Doc) Cornman.

Then, too, I can keep my stock down to a minimum, as I order each month and can check up in a few minutes what is needed. Some times it is necessary for me to have help from some other exchange. I send anyone out with the car or into the store room and he, or the chief operator, can get just what we want without delay. Again, I must say, there is a good deal of satisfaction in having things handy. If you should travel through our territory, you will find a lot of such places and no doubt a good many better arranged than mine, but this suits our exchange very well. If each keeper of supplies would have a system and follow it, he could be more efficient in his work. It soon becomes a habit to have: "A place for everything, and everything in its place."—Contributed by C. C. (Doc.) Cornman, Alta, Ia.

Telegraphy and Telephony with Railroad Applications, by Charles Stanley Rhoads, E. E.; Simmons-Boardman Publishing Co., New York.

While the principles of telegraphy and telephony are alike in commercial and railway service, the conditions to be met are frequently quite different. In the earlier days of applications of the telephone to railway service, equipment modified only slightly from commercial types was applied to existing wire lines and telephone service was established. Results were not entirely satisfactory and a few years ago a group of young men, of whom the author of the present work was one of the leaders, started out on a series of investigations that led to important modifications in railway telephone and telegraph service. It is perhaps not generally known to telephone men that the New York Central Railway now has its own long distance circuits from New York to Chicago and to other points and that these circuits contain repeaters, loaded cable and other features of modern telephone plants.

The present book is an endeavor to present information for those in the railway service but many sections of it will be of interest to commercial telephone companies. Fifteen of the thirty-five chapters are devoted to line design and construction and much information is given that is not available in other publications. The reasons for doing things in the manner called for in specifications is emphasized throughout. The chapters on telegraph apparatus and systems are of special interest to railway men and are of particular value since they contain the results of much original work by the author and his associates. It is of interest to note that Mr. Rhoads has recently become associated with one of the large telephone companies in a supervisory position in maintenance of mechanical switching telephone systems.

GOOD Telephone Service on open wire during the lightning season was unheard of until the Reliable Electric Company began to make self-cleaning lightning arresters.

Uninterrupted telephone service is helping to keep the public friendly to the telephone companies. It costs less to give uninterrupted service.

Reliable Electric Company

3145 Carroll Avenue Chicago, Ill.

(Continued from page 32.)

reproduction cost. The limits of this discussion forbids going into the merits of the decisions on this subject from the case just mentioned down to the recent decision in the Southwestern Bell, the Atlanta and the Bluefield cases. Suffice it to say that if we are to place emphasis on the character of service, in our future regulation, we must not have a theory of valuation which will neutralize all efforts along that line.

In general it can be said that the Supreme Court has given too much emphasis to the legal questions in valuation and not enough to the economic questions involved. To be concrete, if we take valuation of public utilities on a reproduction cost basis, it would be necessary to increase rates and the rate of return because of a marked upturn in the price level regardless of the fact that at that very time the management of a certain utility might be very inefficient, and the service rendered very much below standard. Conversely by the application of this same theory a telephone company might be called upon to accept reduced rates, and a reduced rate of return merely because the level of prices had fallen and in spite of the fact that the management might be consuming much midnight current in an effort to effect economies and to improve the service.

If there is to be any future for commission regulation it would appear that it must be able to reward efficiency in management and to penalize inefficiency. The rate of return allowed a public utility should very definitely take into consideration the character of the service. If the use of the reproduction theory of valuation makes such a course of action impossible then it would appear that it must be discarded.

This body need not to be told that a respectable number of strong state commissions have discarded reproduction cost as a proper basis of valuation. Most students of public utilities are inclined to the belief that a number of our better commissions are more nearly in line with what the future will demand than is the Supreme Court. It is obvious that the commissions being in the front line trench of utility regulation have had a better opportunity than the courts have had to get a vision of the economic problems involved in the selection of a mode of valuation. For that reason the commissions have not let the legal factors outweigh vital economic considerations. Indeed anyone who has read the three recent supreme court cases to which reference has been made appreciates that we may see decisions of that court on valuation in the future which will be in line with the theory of many of our best state commissions, that prudent investment is the best basis for valuation of a utility's property.

It would appear that utility management should be made to stand on its own legs. Factors which are fortuitous, changes in economic conditions which are wholly beyond the control of management should not be charged against it. Neither should increased rewards come as a wind-fall. There must be in our future regulation a definite connection between efficiency and rewards, and inefficiency and penalties if that regulation is not to be supplanted by government ownership and operation itself.

In conclusion it may be said that a fair appraisal of our regulation up to date would appear to indicate that if we are to give adequate attention to changes in economic conditions which in turn will demand the adjustment of utility rates; if we are to cope with such economic and technical problems as depreciation, valuation, and the problems involved in dealing with efficiency or inefficiency in management in relation to the rate of return which should be allowed, we must have strong utility commissions if the interests of both the utility and the public are to be properly safeguarded.

(Continued from page 20.)

cord. Mayo Lenz, secretary-treasurer of the company and Phil Lenz, sales engineer, were in attendance.

Manufacturers of telephone equipment this year staged such complete and instructive exhibits that their showing amounted to a university education in equipment construction and operation.

Automatic had three switchboard units installed and working.

The units included a 100-line plunger-type line-switch unit, a 100-line-rotary type unit and a standard selector trunk board equipped with 40 selectors on two shelves of 20 switches each. The selector board and the rotary line switch unit was manufactured for service in Fort Wayne, Ind.

To demonstrate the flexibility of Strowger automatic equipment a combination exhibit demonstrated the application of Strowger automatic equipment to the various classes of party and rural line service, including both harmonic and code ringing, service on P. B. X. trunks and to special service desks.

A new feature of the exhibit was a complete 50-line P. A. X. (private automatic exchange) installation.

The exhibit also included a very attractive display of Type 21 common battery telephones and their parts. A new feature, not before displayed at a convention, was the equipping of wall and desk telephones with writing pads instead of dials, for the use of those telephone companies now operating common battery manual equipment, but planning and preparing for the installation of automatic equipment at some future time.

A helpful idea that saved time in locating the Automatic men in attendance was the register hung by the side of the entrance to the display. Automatic representatives at the convention: H. A. Harris, H. L. Harris and Grant Pelton, vice-presidents; W. F. Benoist, treasurer; T. C. Thompson, general superintendent; O. V. Dodge, sales manager; Roy Owens, R. H. Burfeind, A. C. Stratton, F. J. Truby and A. H. Van Koughnet, general sales division; L. A. deBerard, W. H. Walter, L. A. Cutshall, A. F. Combs, C. C. Moore and W. A. Chapin, P. A. X. sales division; W. N. Curtis, foreign sales, and H. E. Clapham, publicity.

How National Carbon spotlighted its line at convention.

Stromberg-Carlson's Superservice switchboard demonstrating "straightforward trunking" was one of the highly interesting features of the display. In addition to the Superservice switchboard, Stromberg-Carlson showed their 102 P. B. X., the 896 magneto telephone, the 986 desk stand, the 1155 central energy steel wall telephone, the 105 magneto telephone and Stromberg-Carlson radio apparatus.

Headed by President and General Manager W. Roy McCanne, the following S-C men were in evidence: Geo. A. Scoville, vice-president and sales manager; W. M. Angle, secretary; R. H. Manson, chief engineer; E. A. Reinke, assistant sales manager; E. A. Hanover, purchasing agent; W. T. Eastwood, advertising manager; S. A. Bayland, general superintendent; E. A. Roworth, assistant secretary;

A. J. Roberts, manager, Kansas City branch; C. W. Schafer, manager, Chicago branch; N. W. Baldwin, manager, Toronto branch;

J. L. Lewis, circuit engineer; J. C. Snyder, sales engineer; C. W. Watson, sales engineer; C. H. Bergman, sales engineer; P. Winemiller, sales engineer; D. W. Brown, manager Rochester sales office; E. G. Eidam, assistant chief engineer; J. S. Gibson, manager, radio sales; A. Lincoln, assistant manager, Kansas City office; H. T. McCaig, assistant manager, Chicago branch; V. Graham, radio engineer;

Salesmen—J. A. Barrett, A. B. Crawford, R. Davis, C. M. Shear, J. B. Wilkinson, M. Wood, W. A. Caldwell, D. Kratz, J. A. Taggart, P. D. Myers, E. H. Merriman, A. M. Roberts, C. F. Sanders, J. R. Thompson, E. F. McCord, J. E. Wilkins, J. Galligan, O. L. Rochon, C. D. Kinne, A. B. Preble, R. Lemont, C. A. Sweet, E. York, L. E. LaFleur, J. McNair, J. Adair, J. Berger, C. Pointon, M. W. Redmond and J. Johnson.

Kellogg's new Universal switchboard made its convention debut and shared honors in the beautiful Kellogg display in the West room, with the Kellogg Service switchboard which was in operation.

The new Universal board, its makers say, performs the services of the common battery and magneto boards, and will interconnect common battery and magneto with ideal results. The board has a maximum capacity of 800 lines. The board will cut over common battery lines to magneto or the reverse, without expense.

Kellogg's complete line of switchboards and telephones was shown together with an extensive showing of Kellogg radio equipment. One of the centers of interest in the Kellogg display was an exhibit of proper line construction methods about which were grouped Kellogg supplies for this work.

Representing the Kellogg company at Chicago were:

J. B. Edwards, J. G. Kellogg, E. F. Potter, D. J. Gillespie, C. H. Reese, C. W. Nelson, E. I. Pratt, C. Ruge, R. W. Siemund, A. D. Boal, J. F. Tompkins, M. A. Bellion, H. D. Cur-

(Continued on page 42.)

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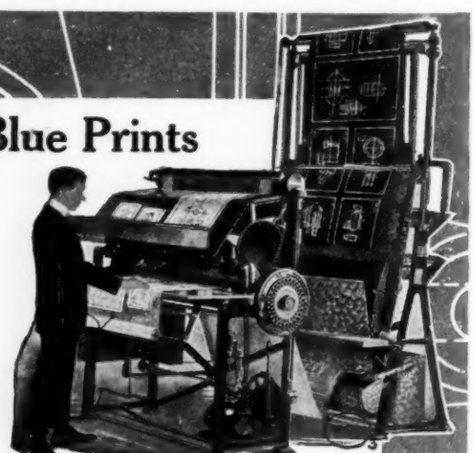

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807 N. Franklin St., Chicago, Ill.

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Some Angles of Depreciation

Functional Depreciation Resulting from Inadequacy and Obsolescence Are Important Factors in Plant Appraisal—Depreciation from Accounting Viewpoint

By CHARLES W. MCKAY

In the last installment of this series of articles, attention was directed to the fact that the *money equivalent* of a telephone property is worth as much, or more, to its owner than money (of a like amount) invested in gilt-edged securities, or deposited in the bank.

This phase of the discussion of property values naturally lead to the subject of Depreciation. *Physical* depreciation was considered in the last article; now, we come to the equally important subject of *Functional* depreciation.

There are two prime factors to be considered in connection with functional depreciation: the functional depreciation resultant from inadequacy and the functional depreciation resultant from obsolescence.

Inadequacy Depreciation

Let us follow through a simple case, to illustrate the inter-relation between physical and functional depreciation. Assume the case of a medium-size company, employing the magneto type of service. Suppose the switchboard is in good condition and shows little, if any, evidence of physical depreciation—that depreciation resultant from wear, tear, age and physical decay. Assume, however, that this board has reached its normal capacity. More lines cannot be added without increasing the size of the switchboard cabinet, and this is found to be impracticable. Of course, the argument may be advanced that increased facilities can be provided by adding another switchboard position, or panel. But let us suppose, for the purpose of our present illustration, that this, also, is impracticable. Conditions in the terminal room, for instance, may be such as to prohibit the installation of the necessary additional terminal facilities, such as frames and racks for protector equipment terminal blocks, etc.

Now (as we already have assumed) the board is in good physical condition; it is not obsolete, for a town of the size and type of the one we are considering, *but it is inadequate* to provide the telephone service required by the community. Hence, the depreciation, or "lowering in value," of this particular board may be attributed, entirely, to *inadequacy*, and may be termed "inadequacy depreciation."

Obsolescence Depreciation.

Let us again consider the same board, but under slightly different conditions, from the standpoint of the telephone subscribing public. In other words, suppose that the town is a little larger, bringing it into the common battery group. Now, assume that the board is in excellent physical condition and that it *can* be enlarged to relieve temporary congestion. Assume, on the other hand, that the town is growing rapidly—so rapidly that the installation of common battery service soon will be imperative, both from an economic and from an operating standpoint. Again, perhaps the subscribers already are demanding the more convenient battery service, knowing perhaps that this service is in use in neighboring towns of comparable size.

Under these conditions, would you enlarge your magneto equipment? Of course not; you would make "the best buy" that you could in the common battery field and sell your old magneto board at the best possible price to some smaller company.

Now, the board we have been considering is in good physical condition and to all intents and purposes it is adequate, but *it is obsolete,* insofar as your present requirements are concerned. Hence, the depreciation, or "falling in worth," may be attributed solely to obsolescence—and, for convenience, this depreciation may be termed "obsolescence depreciation."

Extraordinary Depreciation

There is still another class of depreciation which must be taken into consideration in determining the value of telephone properties, and in establishing a reserve fund that will be adequate to offset "the lessened property value" resultant from depreciation. This fifth cause of depreciation has been termed "extraordinary depreciation." As the term suggests, it is the depreciation resultant from unusual or extraordinary causes. For instance, during the past Spring and Summer, many telephone properties suffered serious damage from heavy wind and sleet storms. In some cases, an outside telephone plant which, previously, would have been rated as being in, let us say, 85 or 90 percent condition, was reduced in the space of a few hours to a zero or negative salvage value.

In the case of our previous illustration, such depletion in value undoubtedly would be cared for by insurance; I refer here to the illustration of the switchboard. In such a case, we do not have to consider extraordinary depreciation; it really is not a depreciation factor. It is provided for by insurance and the amounts paid for such insurance would be chargeable to the general insurance accounts; the insurance company would have to pay the damage and the restoration of the property value would not come out of the funds set aside for depreciation. In a measure, this also applies to sleet and wind storm hazards to the outside plant. Many companies now are carrying sleet and wind storm insurance. In such cases, of course, extraordinary depreciation is not really a depreciation factor, for the reason cited in the case of the switchboard illustration.

Where companies do not carry sleet or wind storm insurance, "extraordinary depreciation" is an important factor to be kept in mind, both in determining present property values and in determining adequate reserves for depreciation.

From the foregoing, it will be readily seen that the depreciation factor is a most important one in determining property values; in other words, in the determination of the so-called depreciated or present values. At this juncture it may be well to interject a word of caution with respect to a common stumbling block in solving the depreciation problem.

There is a vast difference between depreciation as considered from the standpoint of determining present property values and depreciation as considered from the standpoint of accounting. By the term accounting, as here used, I refer to the problem of setting up an adequate reserve for depreciation.

It must be remembered that the function of the appraisal engineer is to determine how much the property has depreciated in value, such a determination being made, solely, through the medium of an actual inspection of the property. The function of the accountant on the other hand is to determine what sum should be set aside each year to provide a reserve adequate to make good the ravages resultant from depreciation.

In the preface of his book, "Principles of Depreciation," Prof. Earl A. Saliers of Yale University, draws an excellent illustration showing the difference be-

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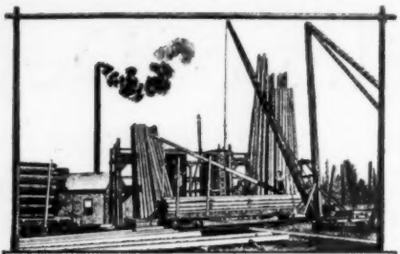

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New York Engineer Invents New Call Register

A new registering apparatus to be used in connection with a telephone set has been invented by Benedetto Sapienza. The device requires no change in the wiring of the telephone set. A battery energizes the recorder. Calls made in absence of attendant at subscribing station are registered, so, according to the inventor the subscriber may learn from the central station the numbers of those who called while the receiving station was unattended.
This device is a great improvement for telephone use and makes it possible for telephone companies to make extra charges on this special service. Write for details.
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tween the functions of the engineer and the functions of the accountant. I believe this statement of Prof. Saliers is worth quoting. He says: "The depreciation problem may be viewed from two standpoints: that of the accountant and that of the engineer. The engineer deals with physical conditions, studies plant deterioration, the necessity of replacement and so on. The accountant devises ways and means of recording, in the most intelligent manner, the facts in connection with the changes. *The work of the two should be correlated through a common understanding of the character and extent of depreciation.* The engineer having shown what the rate of depreciation is, the accountant suggests means for recording it, for providing the replacement funds, etc., and thus for *the preservation of the capital values.*"

This whole subject is so important, in connection with the practical evaluation of telephone properties, that it will be discussed in further detail in the next installment of this series. It is hoped to make the subject so clear that the reader may avoid the pitfalls that have embarrassed many supposedly competent lawyers and engineering experts in the presentation of public utility rate cases.

Transmission Characteristics of Coil Loaded Telephone Cables, by Kazukiyo Ogawa. Electrotechnical Laboratory, Ministry of Communications, Tokyo, Japan.

This publication of the Electrotechnical Laboratory of the Japan Ministry of Communications, a pamphlet of 16 pages, is a mathematical study of transmission over cables having coil loading. The usual assumption in making computations involving transmission over such cables is that the capacity of the cable between two loading coils may be considered as being concentrated at the middle point of the cable. The author's conclusions indicate that errors may be involved when computations of attenuation constant are made at frequencies lower than the cut off point. An approximately equivalent circuit is given that is more suitable than the ordinary assumption.

WANTED—Copy of TELEPHONE ENGINEER for November, 1922. Will extend subscription three months for same. Address TELEPHONE ENGINEER, 28 E. Jackson Blvd., Chicago.

George R. Fuller Made Chief of Independent Pioneers

Chicago, Ill.—George R. Fuller of Rochester, N. Y., was named to be the second president of the Independent Pioneers' association following the retirement of H. E. Bradley from the lead of the organization which he has headed for five years.

Mr. Fuller's election preceded the big dinner and entertainment staged by the Independent Pioneers during the U. S. Independent Telephone convention at Chicago. J. K. Johnston of Indianapolis, Ind., was re-elected secretary and treasurer. Thirty-nine of the foremost veterans in the Independent ranks were made vice-presidents of the organization.

More than a thousand men and women attended the luncheon and vaudeville with which a hard-working entertainment committee provided a merry afternoon for the reunion of the old guard.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912,

of Telephone Engineer, published monthly at Chicago, Ill., for October 1, 1924.

State of Illinois, County of Cook, ss.

Before me, a notary public, in and for the state and county aforesaid, personally appeared W. H. Graffis, who, having been duly sworn according to law, deposes and says that he is the general manager of Telephone Engineer and that the following is to the best of his knowledge and belief, a true statement of the ownership, manager (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 443, Postal Laws and Regulations, printed on the reverse of this form, to-wit:

1. That the names and addresses of the publisher, editor, general manager and business manager are:

Publisher, Telephone Engineer, Chicago, Ill.

Editor, Herbert Graffis, Chicago, Ill.

General Manager, W. H. Graffis, Chicago, Ill.

Business Manager, Jos. M. Graffis, Chicago, Ill.

2. That the owners are (give names and addresses of individual owners, or, if a corporation, give its name and the names and addresses of stockholders, owning or holding one per cent or more of the total amount of stock):

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3. That the known bondholders, mortgagees and other security holders owning or holding one per cent or more of total amount of bonds, mortgages, or other securities are (if there are none, so state):

None.

4. That the two paragraphs next above, giving the names of the owners, stockholders and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company, but also, in cases where the stockholder or security holder appears upon the books of the company as trustees or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any person, association or corporation has any interest, direct or indirect, in the said stock, bonds, or other securities than as so stated by him.

5. That the average number of copies of each issue of this publication sold or distributed through the mails or otherwise, to paid subscribers during the six months preceding the date above is..... (This information is required from daily publications only.)

TELEPHONE ENGINEER,
W. H. Graffis, Gen. Mgr.

Sworn to and subscribed before me this 25th day of Sept., 1924.

(Seal) C. A. LE ROY.

(My commission expires Oct. 4, 1926.)

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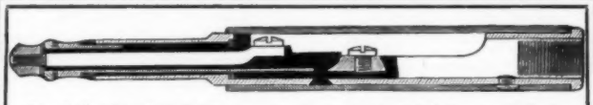

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(Continued from page 38.)

rier, H. P. Schmidt, A. Baade, A. E. Reynolds, C. Geiger, W. J. Stanton, W. S. Boze, C. M. Bowling, R. H. Coyne, H. B. Dudley, H. N. Faris, H. W. Hogue, Jay Houghtaling, W. R. Kimmel, R. B. Miles, B. A. Ogden, Glanton Smith, R. K. Smith, J. A. Stratton, H. A. White, E. F. Woodward, B. Woodbury, H. D. Hurlbut, S. A. Mounteer, W. S. Green.

One of the most-used demonstrations around the convention was that of the Churchill Cabinet. Spencer Gullicksen of the Churchill company had one of the Churchill booths installed near the registration desk, with outside telephone service available. Other Churchill booths were installed around the convention as part of distributors' displays.

W. C. Meader and V. C. Zaenglein of the Bell Lumber Co. were at Chicago reminding the pole buyers of the Bell facilities for supplying speedily selected poles. Bell business has been continuing at a good gait with telephone companies, according to the Chicago reports.

Cut-out sections of the Unique gasoline and kerosene blow-torches were exhibited by A. A. Siebert and E. E. Goller which helped to explain the good points of these products.

F. A. Bowdle, head of the Bowdle Accounting System of Cerro Gordo, Ill., was conspicuously among those present, making a display of the Bowdle printed forms which are widely used for accounting work in the telephone industry.

Templeton-Kenly's showing of Simplex jacks was one of the high spots of the labor-saving construction equipment display. The new Simplex cable reel jack and the Simplex pole pulling and straightening jack which is standard with many of the world's leading wire companies, as well as the Simplex truck jacks, were shown by C. A. Crane, Jr., and W. H. Kreer.

A Universal truck which has a Fordson power unit was one of the interesting items in the convention. The maker, the Universal Truck Corp., was represented by Homer Eubanks and L. M. Herkert.

The new cable ring made by the National Telephone Supply Co. of Cleveland, was well received at the convention. The ring is made of copperweld and galvanized steel wires. The galvanizing is done so an absolutely smooth surface is obtained, and no injury done to the cable sheath. Fred Auxer and C. C. Mahan of the company also showed the porcelain knob for drop wire, copper sleeves and other National telephone supplies.

Page and Hill again had their room floored with cedar boughs so the company's representatives, L. L. Hill, S. G. Harris, Buford Adams and F. C. Treat could "do their stuff" in a fitting stage setting.

A demonstration of the new Drive-in anchor was made by the Star Expansion Bolt Company. Telephone fixtures were attached to a brick column with the Drivein device. The Drivein employs a nail instead of the customary bolt or screw in making a staunch support. H. H. Munger, E. C. Knudson, R. A. Armie and H. C. Stewart were in attendance.

Standard Underground Cable again was on deck with a showing of its cable and wire for telephone construction work. The company had at the Chicago convention Arthur Anderson, E. J. Pietzcker, W. M. Rogers, H. K. Weld and J. J. Hohmann.

Again the National Carbon Co. assumed responsibility for "keeping the doctor away" from the convention by continuing its practice of giving apples to its guests. King Tut's telephone also made its annual appearance. Columbia telephone batteries and Ever-Ready radio batteries and flashlights, in accordance with their usual custom, inspired many of their users to favorable comment. National Carbon men at the Sherman were: E. S. Schulz, L. G. Drake, Alvin Zenkan, C. R. Howell, J. M. Spangler and D. Gardner.

Al Johnson, head of the A. J. Johnson Co., manufacturers' representatives of Chicago, demonstrated at the convention why his business has grown so during its first year. He booked a good volume of orders at the Sherman and got in line for a flock more on construction material, Victor dry batteries, radio sets, and the Dover electric switchboard soldering iron. Superior insulation tape, which is one of the big sellers of the Johnson line, in the telephone industry, was featured in the display.

Two new switchboards were drawing cards at the Monarch display. A common battery associated multiple switchboard with universal cord equipment, among other features, and a new cordless switchboard held their coming-out parties.

A complete display of Monarch switchboards and telephones, which included the new Monarch line of intercommunicating telephones, was on view.

(Continued on page 44.)

COMING CONVENTIONS

Canada—Toronto, Carls-Ritz Hotel, Nov. 26-27.

No. and So. Carolina—Charlotte, N. C., Hotel Charlotte, Dec. 3-4.

South Dakota—Aberdeen, Jan. 14-16.

Minnesota—St. Paul, Hotel Francis, Jan. 20-22.

North Dakota—March 10-12.

Kansas — Topeka, Hotel Kansan, April 7-9.

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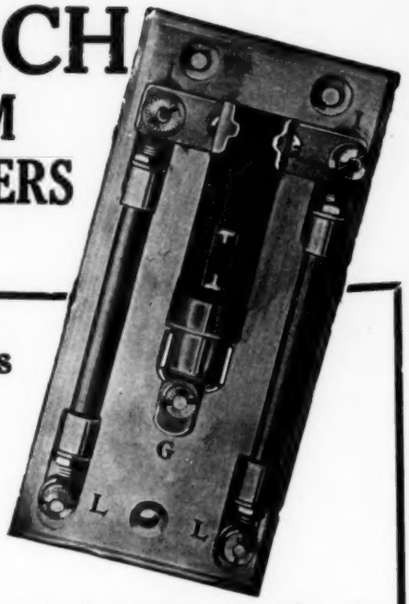

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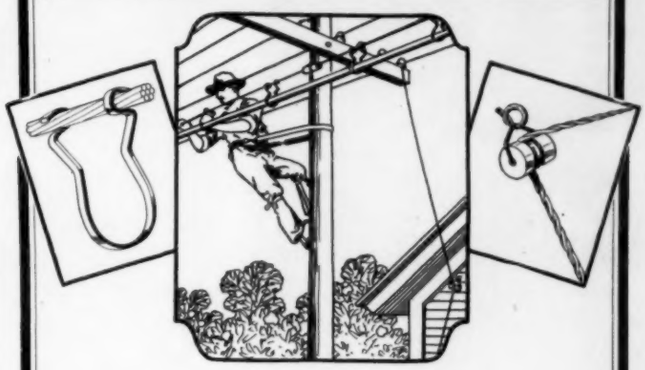

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have a flexibility that enables you to tie drop-wires with utmost ease, speed and economy. When occasion demands the C-B porcelain knobs can be readily removed from the bridle rings. For a neat job and low cost, use National C-B knobs.

Complete details will be sent you on request.

The National Telephone Supply Co.
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NATIONAL CABLE RINGS are made in Canada by N. SLATER & CO. of Hamilton, Ont.

(Continued from page 42.)

Monarch's men at the Independent meeting were:

H. L. Harris, Kansas City, Mo., vice-president; L. Q. Trumbull, general manager; A. W. Steinke, chief engineer; R. C. Ridpath, manager supply sales; Geo. O. Wilson, sales engineer; V. A. Moscow, office sales representative; R. C. Chock, engineer; Ashley S. Johnson, sales representative in Georgia, Alabama, South Carolina and Florida; C. W. Snyder, sales representative in Indiana and Michigan; P. L. Picot, Ohio sales representative; H. C. Shear, Iowa sales representative; R. O. Palmer, sales representative in Minnesota and North Dakota; F. R. Paris, Illinois sales representative; I. D. Viets, sales representative in Missouri and Kansas; E. E. Donoho, Texas sales representative; Z. A. Kimbro, sales representative in western Iowa, South Dakota and Nebraska; L. V. Anderson and P. A. Foagh, office sales representatives; E. F. Kinson, advertising department.

The American Electric Co. held the fort with a goodly display of its new type telephones, and five switchboards of various types, to vie with the American's radio equipment for the spotlight. The hand microphone sets again registered strong. The new Burns Loudspeaker made a decided hit with the telephone men who were getting a close-up on the latest in radio. P. C. Burns, Eugene Brown, A. A. Cronk, F. L. Middleton, F. J. Reuhlman and W. T. Curtis were the American men in action at the booth.

F. C. Miles and C. Smith, the convention corps of the Anaconda Copper Mining Co. and American Brass Co., were present at Chicago showing the Anaconda and American wire. One of the new products shown was a copper antenna wire which was made in the company's Kenosha plant.

The Addressograph Co. with Art Davis on deck, continued its sweep of the telephone business. The new one piece indestructible address plate was shown together with models of the Addressograph that are found so useful in telephone company work.

Another popular item of telephone company office equipment shown at the convention was the Acme visible card system with its new application for handling subscribers' accounts.

Lamp supervision for magneto switchboards adaptable to all sizes of boards was one of the engaging features of the Leich Electric Co. exhibit. This Leich lamp supervision may be operated from alternating current by using a transformer. Leich magneto telephone equipment and ringing machines and items from the rapidly growing Leich line of radio equipment also were on display. Radd spark plugs and magnetic timers, which give the Leich company a big volume of business, were shown. O. M. Leich, secretary and general manager of the company; A. J. Kohn, sales manager; A. C. Reid, chief engineer; B. L. Parker, T. J. Gullian, John S. Campbell, Carl Malmorg, W. C. Drysdale, Leich's retiring Illinois salesman, and his successor, W. S. Fisher, represented the company at the convention.

North made an interesting display of a P. A. X. demonstrator built for the U. S. Signal Corps, which embodied three of the North principal features, rotary line switch, line finder, and all relay. The North exhibit served to illustrate the company's claim for the operating efficiency and low maintenance of key-board controlled equipment with relay movements instead of the step-by-step switch movements. The company had in attendance: C. H. North, S. B. Ridge, general sales manager, Conant Wait, H. E. Nott, J. H. Watkins and A. Pfieffer.

Cook Electric company's stage-setting this year featured a light-house having as its principal feature a polecable terminal made up with revolving lights. The protection motif thus symbolized was brought down to brass-tacks by the display of Cook terminals and the Cook rack with No. 100 heat coil protection in operation. President George Folds headed the Cook troupe in attendance which included John Japp, D. C. McKee, E. E. Shields, Chester Ruth, A. M. Wilkins and J. S. Baker.

Holtzer-Cabot's quarters contained a motor generator charging panel, a charging set, four types of ringing dynamotors with interrupters for machine ringing and a small exchange magneto ringing set frequency meter as its power plant features. The Holtzer-Cabot lineman's test set, too, was one of the attractions of the lay-out. Holtzer-Cabot's progress in the radio business was demonstrated by its display of loud speakers, which included two table models and one for attachment to a phonograph. T. G. Meinema, M. E. Galt and Wm. Reid were in attendance.

Orangeburg fibre conduit, Columbia dry batteries and R. C. A. radio equipment were the brands featured in the Illinois Electric Co. display. There also was shown the Illinois lines of construction tools and material. Tom Endsley, G. C. Merritt and J. A. Duncan represented the Illinois company.

A new tree-trimmer was one of the leaders among the construction tools shown in the booth of the Leach Co. Climbers, reels, cant hooks, tamping bars, pike poles and other construction equipment of the Leach line was presented by Elmer Leach, Jr., and C. O. Wenzel.

J. K. Johnston's imposing roster of 400 companies for which he has done appraising reached out for further additions successfully by virtue of the contacts renewed and new associations made by the veteran telephone engineer during the progress of the convention.

Reliable Electric's display of protective devices with its headliner being the Reliable self-cleaning saw-tooth lightning arrester which has found such wide favor in the industry, made more converts through the efforts of W. L. Cook, George Rodormer and Jos. Stelzer at the convention. The items in the Reliable line were given considerable attention by the convention gathering. The meeting proved unusually productive for Reliable in actual business secured.

A construction specialty which was well received by the conventioneers was the Pearl service wire bracket, which was shown by its maker Wm. H. Pearl of Indianapolis.

With the accounting session meeting drawing so well it was certain that the exhibit of the Coffey System and Audit Co. would be well received. An interesting and helpful showing of the company's methods, forms and supplies for the accounting requirements of all classes of companies was made by the Coffey establishment. J. W. Coffey, president, and W. J. Marold and M. E. Jones were in attendance.

Again the French Battery and Carbon Co. quarters were a popular parking place. French telephone battery business continues to grow speedily according to the word heard at the Chicago meeting, and naturally the radio battery volume is constantly climbing. A new dealers' showcase for the French line was one of the attractive features of the display. Frank Eldridge, the generalissimo of French's telephone battery peddling force, was in charge of the display; George Shipley, French's sales manager; Frank Foster, Herman Doughty, W. S. Marvin, and C. D. Boyd were the other notables in attendance.

The exhibit of Aristos Copper-welded wire, the first of its kind ever made at a telephone convention, was especially interesting with specimens of the various types of the wire in different stages of manufacture, being shown. W. M. Page, chief engineer of the company, Erick Elg and W. W. Martin, Jr., were representing the Copperweld company.

Many new forms in the Con P. Curran Printing Company's line of standardized printed forms for telephone companies were displayed at the Chicago meeting. Directories of several hundred different telephone companies, made according to the Curran plan for economical standardization of directory printing, also were on display. Con P. Curran, Jr., vice-president and manager of the company's telephone sales was at the booth, together with Ray J. Gartland, W. C. Kendall, Harold E. Wilson and John B. Beck.

W. S. Ferguson, a welcome national convention perennial, and C. L. Knox continued to advance the interests of Lynton T. Block and Company in insuring telephone companies. The Block specialization in this work, which has been maintained for many years, has lined up an imposing roster of policyholders.

Hubbard and Co. presented specimens of the Pierce "hardware that makes the line" and Pierce construction specialties in an array that showed the merits of the line to good advantage. W. R. Palmer, A. R. Smith, A. McIllrath and H. C. Landsell represented Hubbard and Co.

Victor telephone and radio batteries made by the flourishing Carbon Products Co. were shown in a busy exhibit presided over by Warner Jones and R. R. MacCracken. New radio A and B batteries were prominent features of the display.

Telephone and radio storage batteries made by the Electric Storage Battery Co. also attracted the attention of the battery students. M. E. McCall and C. Taube of the company were in charge of the booth.

The Thor-O-Dyne radio set exhibited by Frank Eidson and George Eldridge of the Eidson Radio Mfg. Co. made quite a number of boosters among the telephone men who witnessed its performance at the Chicago convention.